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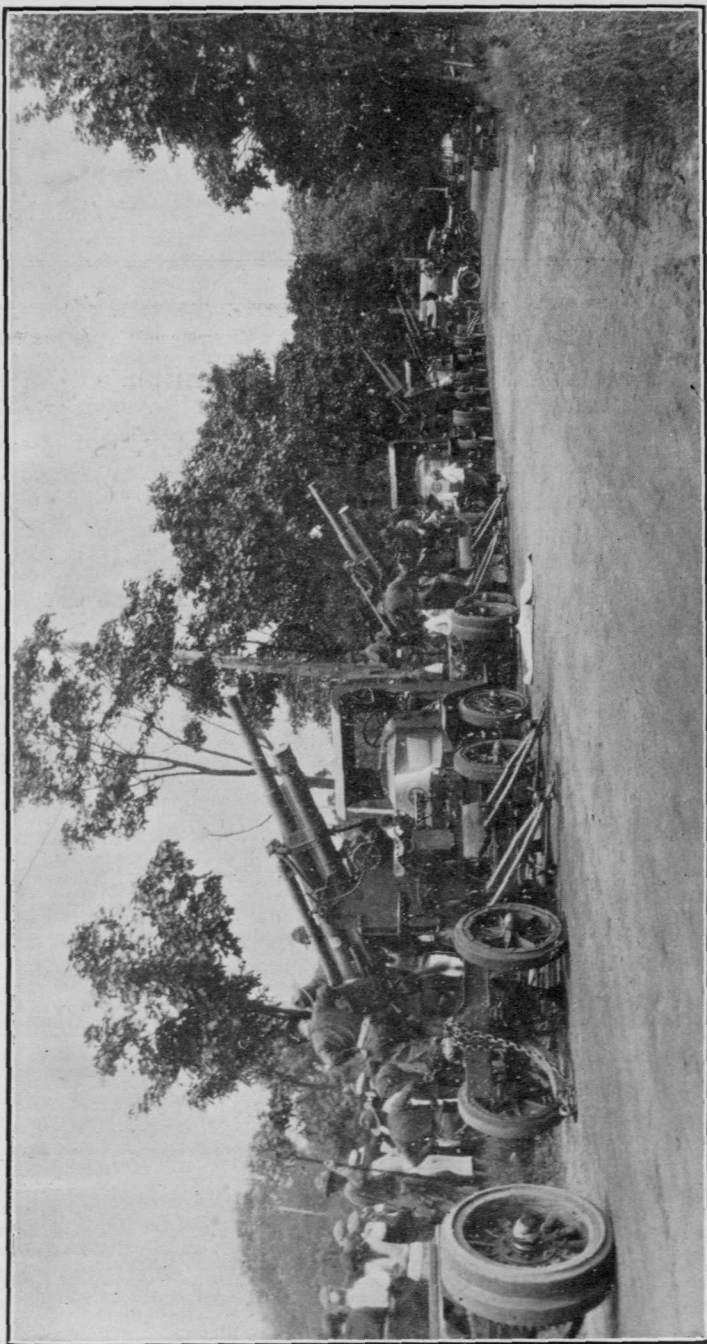
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3-INCH A. A. GUNS ON CHRISTIE MOUNTS OF THE 62ND ARTILLERY

The Coast Artillery Journal

Vol. 59 No. 4

OCTOBER, 1923

Whole No. 206

Critical Analysis of Operations of Third, Fourth and Fifth French Armies and British Army from About August 15 to September 15, 1914

By Colonel Weston P. Chamberlain, Med. Corps

1. THE GERMAN PLAN



HE von Moltke plan in 1914 contemplated an attempt to envelop the French armies. A strong force in Alsace-Lorraine was to contain the French operating there, while the much stronger right flank of the Germans, consisting of the First, Second, Third, Fourth and Fifth Armies, was to swing through Belgium, Luxembourg and Northern France, pivoting on the fortified line Moselle—Metz—Thionville. On August 4 Germany violated the neutrality of Belgium, thereby committing her first great error, a mistake which promptly brought Great Britain into the conflict and which gradually alienated from the Central Powers the sympathy of a large part of the civilized world.

2. THE FRENCH PLAN

French mobilization was based upon the assumption that the main German effort would come on the eastern frontier, but plans were made for a possible attack through Belgium and an understanding existed with Great Britain that the latter would render assistance in the event of an offensive war by Germany with violation of Belgian neutrality. In the latter circumstance the French appear to have based their plan on the assumption that invasion would take place east of the Meuse (1) (19)*. To provide for such a contingency the *Fourth French*

* Numbers in parentheses refer to the corresponding bibliographical references to be found at the end of this paper.

Army, (three corps d'armee and one cavalry division), under General de Langle de Cary, was mobilized as a reserve in the region Ste. Menehould—Commercy, whence it could with ease proceed to the north or to the east. The *Fifth Army*, (five corps d'armee, two reserve divisions, one cavalry division, and the provisional cavalry corps of Sordet), under General Lanrezac, mobilized along the line Verdun (exclusive) Mezieres (inclusive). The *Third Army*, (three corps d'armee, one cavalry division and three G. D. R.), under General Ruffey (later re-



lieved by Sarraill) mobilized in the region of Verdun (3). The *First* and *Second* Armies were in the neighborhood of Belfort and Nancy respectively. French mobilization proceeded with rapidity and regularity and the initial concentration was completed by August 14 (2).

3. THE BRITISH EXPEDITIONARY FORCE

The British began to embark from England on August 9; two corps and a cavalry division, about 70,000 strong, had completed their concentration just south of Maubeuge by August 20. On August 21 the Army, under command of Sir John French, began its march northward.

The GERMAN ADVANCE
from
A FRENCH STAFF STUDY

This map illustrates the German advance into France during World War I, based on a French staff study. The map shows the German offensive strategy, with arrows indicating the direction of the advance. Key German commanders and their units are labeled, including Von Kluck, Von Bulow, and Von Haus. French positions and units are also marked, along with various towns and cities. The map includes a scale bar and a compass rose.

Key Locations and Units:

- German Advance:** Von Kluck, Von Bulow, Von Haus.
- French Positions:** Foch, Maunoury, Lanrezac, Sarrail, etc.
- Towns and Cities:** Lille, Arras, Cambrai, Amiens, Compiègne, Paris, etc.

4. FRENCH MISCALCULATION

What the French did not foresee was the great number of troops which Germany would send through Belgium, the promptness with which the Belgian forts would fall, and the extreme mobility which the enemy would achieve by rapid marching and extensive use of motor vehicles (11). According to some authorities, the defense of Liege did not hinder the German advance appreciably (12); others consider that a delay of 48 or 72 hours resulted (4) (18) (64). This delay, short as it was, proved of great value in preventing disaster to the British Forces and Fifth French Army (5) (18). The Germans had evidently expected an easy capture of Liege and at the outset of the attack were not provided with the heavy howitzers which ultimately demolished the fortifications. Even though all the forts had not fallen, it is thought that the German armies could have passed through Belgium somewhat sooner than they did.

5. INITIAL FRENCH OFFENSIVE IN ALSACE-LORRAINE

The initial offensive of the French was largely influenced by sentimental or political considerations and was made by the covering troops about Belfort which moved forward into Alsace on August 7. After preliminary successes these forces were heavily attacked and compelled to retreat. By August 14, when the First and Second Armies were ready for a general advance, Alsace and Lorraine were invaded in force. These armies, depleted by needs of Joffre on the western flank and lacking heavy artillery support, were unsuccessful in their attacks and were presently forced back by the German Sixth and Seventh Armies to positions covering Nancy and Luneville, where they were carrying out a successful resistance against new German onslaughts during the first stages of the battle of the Marne.

6. EARLY MOVEMENT ON NORTHERN FRONTIER

Reconnaissances by General Sordet's cavalry nearly to Liege on August 6-8, and through the Ardennes and toward Namur and Charleroi, August 11-15, failed to disclose any large bodies of the enemy. German cavalry, with rifle and machine gun fire by Jagers and cyclists, prevented penetration to a distance sufficient for disclosing German concentrations (20). These results confirmed the French in their earlier views that the Germans were unlikely to advance in strength north of the Meuse valley. It was not till August 15 that General Joffre received definite information that large enemy forces were moving westward through Liege (20). Steps were at once taken to strengthen his left flank. The Fifth French Army was ordered to move across the Belgian frontier into the angle between the Sambre and the Meuse in the vicinity of Charleroi, Namur and Dinant; it was reinforced by the

Eighteenth Corps (withdrawn from the Second Army.) The Ninth Corps and three divisions destined for Alsace were also sent northward. The Fourth French Army was moved up to the frontier of Belgian Luxembourg to take over the area vacated by the Fifth Army. General d'Amade was sent to Arras to take command of a group of territorial divisions in that region with a view to meeting German cavalry raids into French Flanders. All these movements northward were completed by August 21, probably before General Joffre recognized the strength of the German advance, particularly north and west of the Meuse (20). Meantime the British Army on August 22 had arrived at positions in the vicinity of Mons, its right flank being in contact with the left of the Fifth French Army near Thuin. *The strength of the Fifth Army and the British at this time was about 270,000 between Dinant and Mons, against whom were opposed more than 400,000 Germans (20). Even as late as August 22 the view held at French headquarters appears to have been that it would be possible to envelop the enemy north of the Meuse by an advance pivoting on Namur (20).

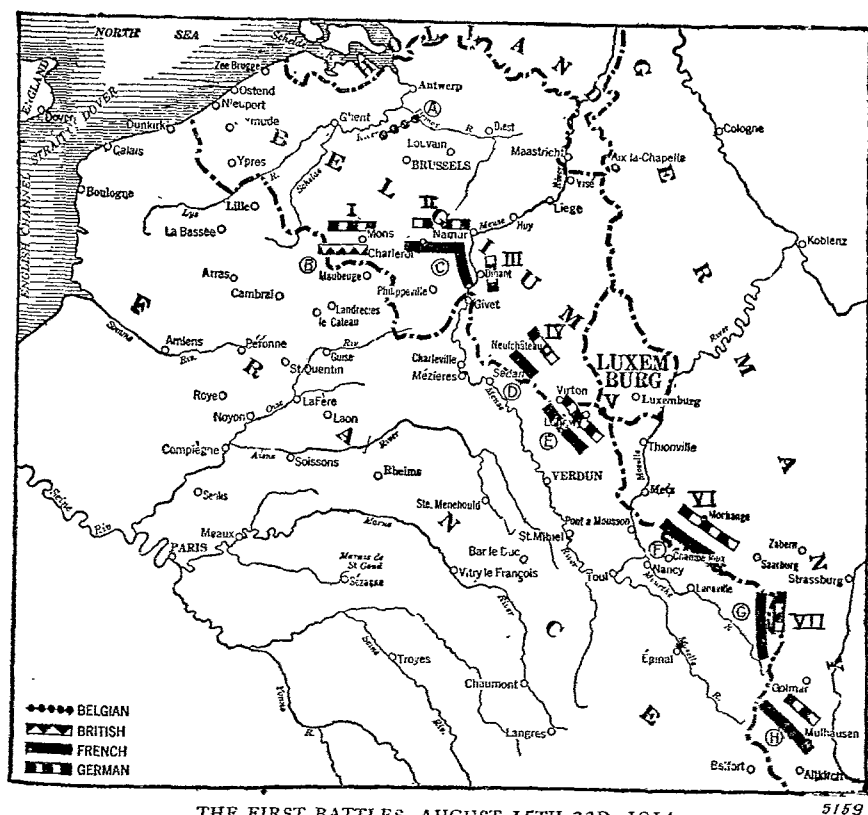
It is the view of Simonds that Joffre's original conception had been to hold the Fifth French Army and the British forces at the French frontier facing Belgium until the magnitude of the German thrust through Belgium could be estimated, hoping that his attacks in Alsace-Lorraine would compel withdrawal of some enemy troops from the north. Yielding to appeals of the Belgians, and apparently influenced by the urgings of French politicians, Joffre changed his plans and sent Lanrezac and the British northward to Charleroi and Mons just as the defeats of his armies in Lorraine ended the chance of lessening German pressure in Belgium. As a result, the Fifth French Army and the British forces narrowly escaped destruction. It appears that Joffre at this time still had no conception of the strength and the rapidity of the enemy's advance through Belgium (13).

7. OFFENSIVE IN THE ARDENNES

The Fourth and Third French Armies assumed the offensive but on August 21 came in contact respectively with the forces of the Duke of Wurtemberg north of Neufchateau and with the German Crown Prince near Virton. Before barbed-wire entanglements and in the face of

* "The details of the new French offensive northward into Belgian Luxembourg were based on faulty information as to both the strength and disposition of the German forces north of Metz. The French Higher Command believed them to consist of two independent groups of six or eight corps each, one in Belgium and the other about Thionville, whereas in reality they formed a solid mass of attack of 26½ corps advancing on all roads leading into northern France between Brussels and Metz. It is not surprising, therefore, that the result of the offensive was very different to the expectation of those who conceived it. The principal attack was to be delivered by the French center, the Third and Fourth Armies, into Belgian Luxembourg, while the left wing, the French Fifth Army and the British Army, was to advance northward to beyond the Sambre and hold in check the German force moving through Belgium until the attack of the center could become effective." (27).

heavy artillery fire the French were repulsed in disorder and, as the Germans advanced, were forced to retire (13). On August 24 and 25 they were on a line running through Spincourt and Montmedy to near Mezieres. Henceforth these two armies shared in the general retreat in order to maintain the alignment with the Fifth Army, but they were never seriously shaken and on August 28 inflicted heavy losses on the Germans who were attempting to cross the Meuse between Sedan and Dun.



THE FIRST BATTLES, AUGUST 15TH-23D, 1914

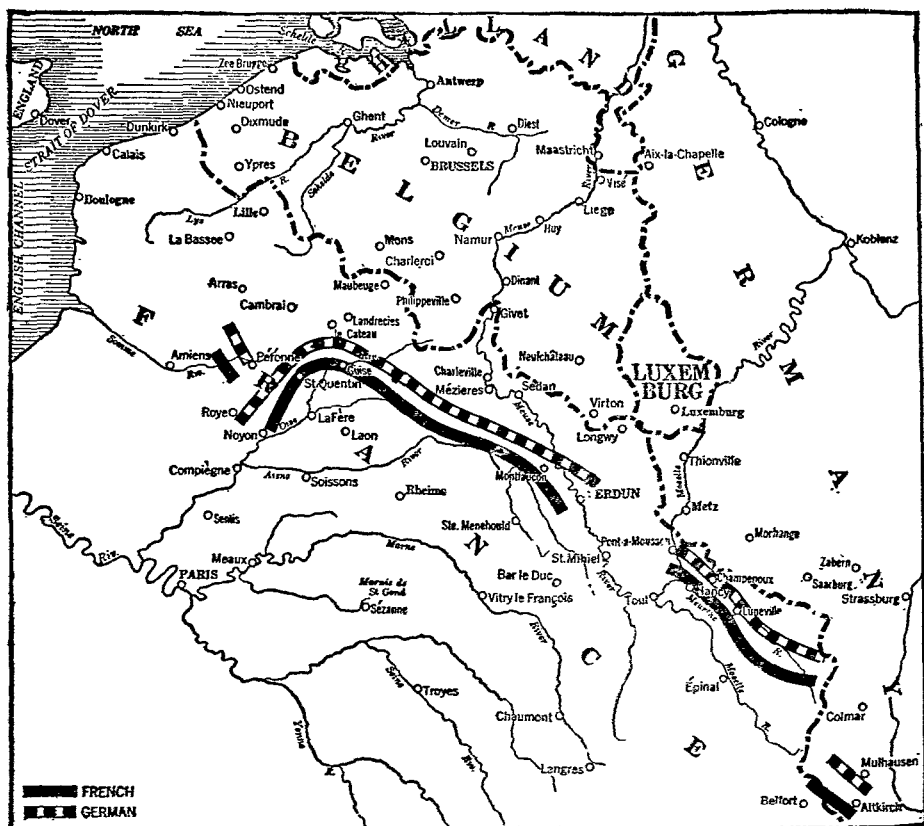
A-Belgians C-Lanzarac E-Ruffey G-Dubail
B-British D-De Langle de Cary F-Castelnau H-Pau

MAP No. 3

8. THE BATTLE OF THE SAMBRE (CHARLEROI)

A more serious blow was now to fall upon the French in the angle between the Meuse and the Sambre. Having disposed of the Belgian Army, the First, Second and Third German Armies (Kluck, Bülow and Hausen), with 13 corps were striking against the Fifth French Army and the British prolongation to the West. On August 21 the Second

German Army under Bülow attacked the French holding the crossings of the Sambre near Charleroi and pushed them back after desperate fighting, which continued during the 22d, the French being slowly withdrawn to a line on Metet, five miles south of Charleroi, by the morning of the 23d. On the 23d Lanrezac learned that the Third German Army under Hausen had forced a crossing of the Meuse at



THE SITUATION OF THE FRENCH AND GERMAN ARMIES ON AUGUST 30, 1914

MAP No. 4

Dinant and was threatening his line of communications with France. The First Corps, which had been relieved on the Meuse the night before by the 51 Division Reserve, was sent back to Dinant and pushed back the Germans for the time, but as a result was unable to participate in the battle with Bülow where its presence might have been decisive. Successful attacks by the Germans continued. A retreat of the Fifth French Army on the night of the 23d-24th, until the flanks rested upon the forts of Givet and Maubeuge respectively, removed the danger of

immediate envelopment, but the superior numbers of the enemy necessitated further retirement.

It is important to note that on the morning of the 23d, when the battle of Mons opened, the French were far south of the British right flank; at dawn of the 24th, before the British had begun to withdraw from Mons, the French Fifth Army had been for some 12 hours in retreat (21).

9. THE BATTLE OF MONS AND THE BRITISH RETREAT

On Sunday, August 23, the British Expeditionary Force was drawn up along the Mons—Conde canal and in a prolongation of that line to the east, being in junction with Lanrezac's Fifth Army at Binche. Mons was near the center of the position which was about 25 miles in length. There had been no expectation that a battle would be joined in this locality which, like Charleroi, was not well suited for the purpose. When day broke on the 23d Von Kluck had four active corps and three cavalry divisions within striking distance, about 160,000 men and 600 guns as opposed to 70,000 British and 300 guns (21). Kluck was probably in doubt as to the strength and position of the British and was always of the opinion that they were based on Dunkirk and Calais. Much of Kluck's army was so far away that it could not be brought into action until evening of the 23d. He attacked with the forces available, beginning about 10:30 a. m., and established a great superiority in artillery fire. Infantry attacked in mass, mainly against Smith-Dorrien's corps, and suffered severely from the accurate rifle fire of the British. Toward evening von Bülow's Seventh Corps was slowly advancing toward Haig's forces near Binche, which had not been seriously engaged; Kluck's Second and Fourth Corps had marched too far southwestward to effect an envelopment. On the whole, the British held their own, with no idea that they were facing overwhelming forces and were in great danger of envelopment on both flanks. About 5 p. m. Sir John French received a message from General Joffre advising him of the strength of the German forces, that Namur had fallen, and that the Fifth French Army was in full retreat. During the night orders were issued for a retreat at daybreak (33) on Bavai, west of Maubeuge, but through that night the army lay isolated in the presence of an enemy of more than twice its strength. Many precious hours were lost as a result of French's delay in beginning the retreat (22), though the heavy transports and ambulances began to move on the evening of the 23d (33). Haig's Corps had prepared for withdrawal during the night and slipped away early before Kluck's Ninth Corps had completed preparations for attack. An attempt to envelop Smith-Dorrien's Corps on the 24th failed, as that corps had withdrawn. The British Army retreated in a south-westerly direction and on the night of the 24th had reached the line Maubeuge—Bavai and an extension of that line to the west.

The movement had not been seriously interfered with by the enemy, although present in greatly superior numbers. The British cavalry brilliantly covered the retreat on this and following days. At this point French recognized that the Germans were aiming to push his army in on the forts of Maubeuge (29), which would mean ultimate capture, so the retirement was continued before dawn of the 25th in the direction of Le Cateau and Landrecies. The two corps were separated by the Forest of Mormal during the march and by a considerable gap on the night of the 25th-26th. During the night the Germans made serious attacks on the First Corps at Maroilles and Landrecies, during which some assistance was rendered by the French on the right flank.

It was the intention of French to continue the retreat of the whole Army early on the 26th but Smith-Dorrien found at dawn that the enemy were advancing in dense masses close to his front and that his troops were too exhausted to continue the retreat. He therefore issued orders to stand and fight south of the Le Cateau—Cambrai road. Requests for assistance from Sordet's French cavalry produced no results because Sordet's horses were exhausted. Determined attacks, with heavy artillery support, were made by the Germans throughout the forenoon and at 1 p. m. the British lines were everywhere intact, but the Germans had begun an enveloping movement on both flanks. It was decided to begin the retreat at 3:30 p. m. and this was accomplished, though with considerable loss, and the march continued through the night. The columns proceeded through and westward of St. Quentin to the Somme near Ham and arrived safely on the 28th along the line of the Oise between Noyon and LaFère. In the view of General Maurice, von Kluck for the second time had been presented an opportunity for inflicting an annihilating defeat on the British Army and had failed (22). Von Kluck himself in summarizing the action up to the Somme (August 29) says in part

“ * * * * In spite of great efforts of the First Army, the British had escaped the repeated attempts to envelop them. They continued their retreat southward. The Army of General d'Amade was surprised while still in the act of concentrating, * * * in the operations against the Armies of General French and General d'Amade, rapidity of advance and immediate attack had been the decisive factors. By these means cooperation between the Belgian, British and French had been prevented: each had been taken in detail while still deploying, and defeated. The dispatch of General French shows clearly the embarrassed state of his Army, as also that of his Allies. This gallant British Army, with such excellent fighting qualities, had to change its base from the Channel ports to St. Nazaire * * * (28).

During the 25th and 26th French territorial troops in the vicinity of Valenciennes, Lille, Arras and Cambrai delayed pursuing German cavalry and parts of von Kluck's Second and Fourth Corps, thereby assisting the British retreat. They were under General d'Amade and after being attacked at Cambrai by the German Second Corps fell back on Bapaume, whence they marched to Peronne in touch with

Sordet's cavalry. On the 28th they were again attacked near Peronne and fell back to Amiens.

10. INVESTMENT OF MAUBEUGE

After the British retirement from the vicinity of Maubeuge on August 24 the Germans began the investment of that fortress, which offered unexpected resistance and did not fall till September 7. Its possession by the French blocked the railroads and complicated the German supply problem.

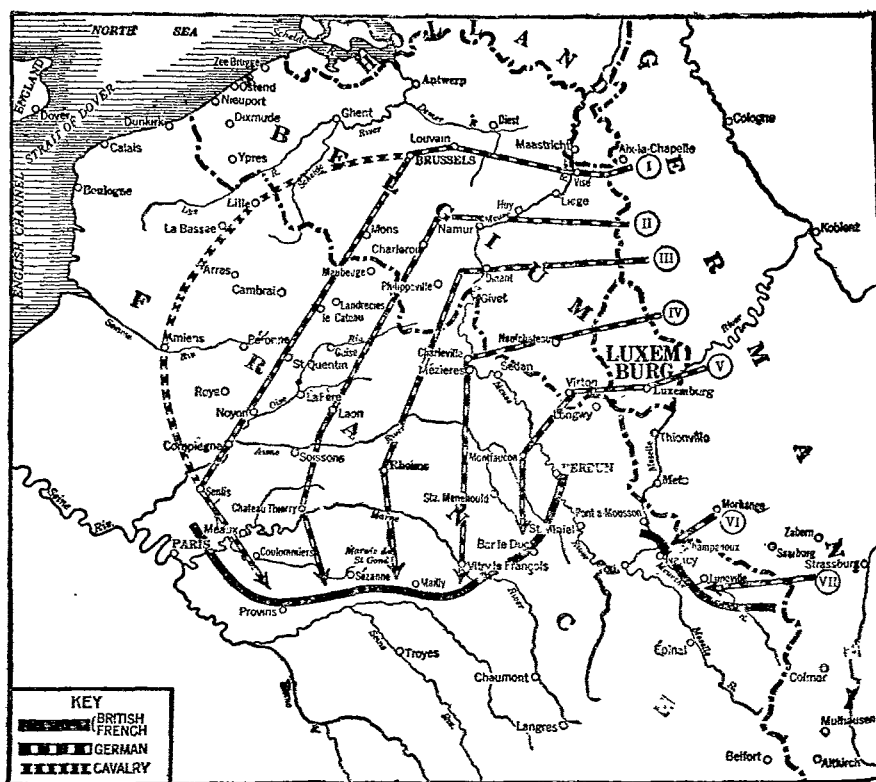
11. FURTHER RETREAT OF THIRD AND FOURTH FRENCH ARMIES

Von Hausen's Third Army, which on the 23d had forced the crossings of the Meuse at Dinant, moved south, driving in the detachments protecting the left flank of the Fourth French Army, which, following its defeat at Neufchateau, was located east of the Meuse. On the 27th the French defense of the Meuse line collapsed. There was some fighting along the line Mezieres—Sedan—Longuyon, three German armies being opposed to the Third and Fourth French armies. The decisive action was on the French left, where the Third German Army (von Hausen) struck the Fourth French Army in the flank, while the Fourth German Army (Wurtemberg) attacked the front. The Fourth French Army on the 29th fell back rapidly toward Rethel (67). This movement necessitated a withdrawal of the Third Army toward the Argonne. Mezieres and Montmedy surrendered on the 27th and Longwy on the 26th (66). On August 29th and 30th these armies were facing northeast on a line running northwest from Cunel through Buzancy and Le Chesne to beyond Dommery, with a gap between the Fourth and Fifth Armies; under continued pressure they were forced back, fighting, between Verdun and Rheims on September 3d and 4th; on the 5th the Third Army, now under Sarraill, was on a line from Verdun to near Revigny, facing northwest; the Fourth Army was across the Marne facing nearly north, with its center south of Vitry-le-Francois, having the new Ninth Army directly west on its left flank.

12. FURTHER RETREAT OF FIFTH FRENCH ARMY AND THE BATTLE OF GUISE

The German Second Army forced back the Fifth French Army on the 24th and 25th, so that on the evening of the latter date it lay south of Sobre-le-Chateau, and was drawing away from the Fourth French Army. The German Third and Fourth Armies in heavy fighting were trying to force their way across the Meuse and between the Fourth and Fifth French Armies. On the 27th Lanrezac was over the Oise above Guise when about 1 p. m., orders were received to attack at once and with vigor in the direction of St. Quentin (10). This change in policy was dictated by a desire to relieve pressure on the British and

was adopted as a result of a conference between General Joffre and Sir John French. This action required a change of front of more than 90 degrees and a flank march to the left of a large part of the Army while within range of the enemy, increasing the gap between it and the Fourth Army. These factors prevented an attack before the 29th. The First German Army had meantime moved southwest and was out of the present field of operations. Owing to the movements of the Second German Army, the attack on St. Quentin could not be carried out but



THE GERMAN ADVANCE TO THE MARNE

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I-Kluck
II-Bülow

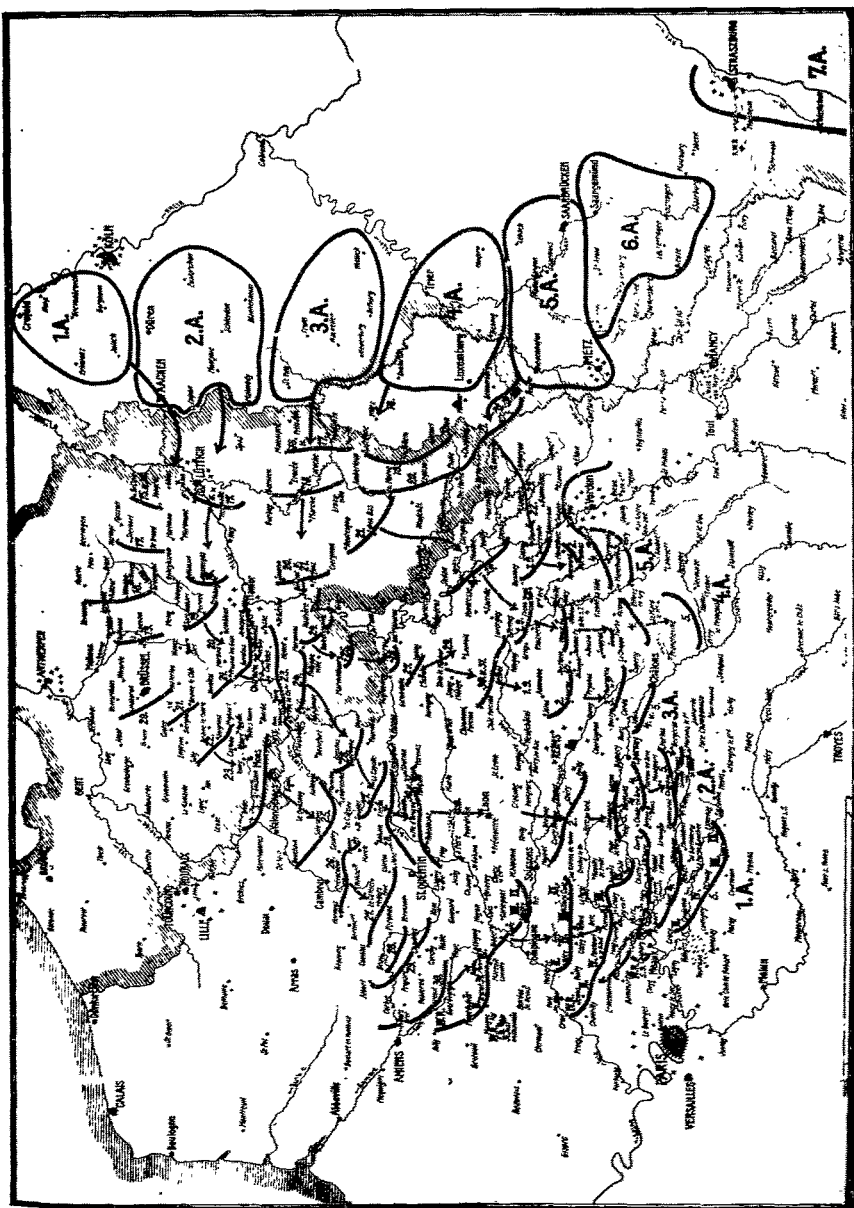
III-Hausen
IV-Württemberg

V-The Crown Prince
VI-The Bavarians

VII-Heeringen

MAP No. 5

was made toward Guise on the morning of the 29th. After unfavorable developments a general offensive about 5 p. m. was successful in driving back the enemy toward the Oise. During the night the two opposing German corps withdrew across the river. This success was neutralized by loss of ground between the Oise and St. Quentin. Though the battle had been successful in delaying the German pursuit, nevertheless, on the morning of the 30th, the situation was such that retreat appeared



MAP No. 6

desirable and it was directed by telephonic instructions received in the evening. On the 31st the forces were disposed in a semi-circle about Laon. Thereafter the Fifth Army continued its retreat, fought a severe battle south of Chateau Thierry and fell back, with the Ninth French Army on its right, toward the Seine. On September 5 it was facing northward with its center about 10 miles north of Nogent. Lanrezac had been relieved by Franchet d'Esperey on September 3.

13. FINAL BRITISH RETREAT

The British were along the line Noyon—LeFère on August 28. During the afternoon of the 29th General Joffre visited Sir John French at his headquarters and the two discussed the situation (34). It was arranged by French to make a retirement to the line Compiègne—Soissons, which was done in the afternoon of the 29th. French promised to do his utmost to remain within a day's march of Joffre, who contemplated a general retirement to the line of the Marne (34). The Germans continued to pursue and hard fighting occurred in the woods of Compiègne and Villers Cotterets on September 1, where Kluck's Army was again encountered as a result of his wheel to the southeast (29). On the 3d the British reached the Marne and crossed on bridges between Lagny and Meaux, which were then blown up. On September 5 the Expeditionary Force, now consisting of three corps and the cavalry, was concentrated upon the Grand Morin south of Coulommiers. The long retreat had ended.*

14. NEW FRENCH ARMIES

Sordet's cavalry, which on August 26 succeeded in getting to the west of the British, assisted the French territorial troops in drawing German troops westward, where Kluck seemed still to think the British left flank was located. Joffre was now beginning to form the Sixth Army on his left flank, the Seventh Corps and Sordet's cavalry serving as the nucleus. On September 5 this Army, under General Maunoury,

* It is of interest to note that on August 30 Sir John French planned to make an eight-days retreat southwest, passing by Paris to the west and then to reorganize south of the Seine. Joffre desired that he remain in his present position. French says "I do not like General Joffre's plan." Also "My confidence in the ability of the leaders of the French Army to carry this campaign to a successful conclusion is fast waning, and this is my real reason for the decision I have taken to move the British Forces so far back" (38). "I have been pressed very hard to remain, even in my shattered condition, in the fighting line; but I have absolutely refused to do so, and I hope you (Lord Kitchener) will approve of the course I have taken." " * * * I can attribute these constant failures (of the French) to no other cause than defective higher leading" (38).

French's original instructions had been that the primary function of his force was to support and cooperate with the French Army (38). Kitchener held that to take the British Army away "would spell something worse than disaster" (38). This withdrawal policy of Sir John French was not approved by the British Government and Lord Kitchener went at once to France and met Sir John French. Meantime the strategic situation had improved and French "cordially undertook to do all that the Government had asked."

General Lanrezac implies in his book that there was not close cooperation between French and Joffre (26).

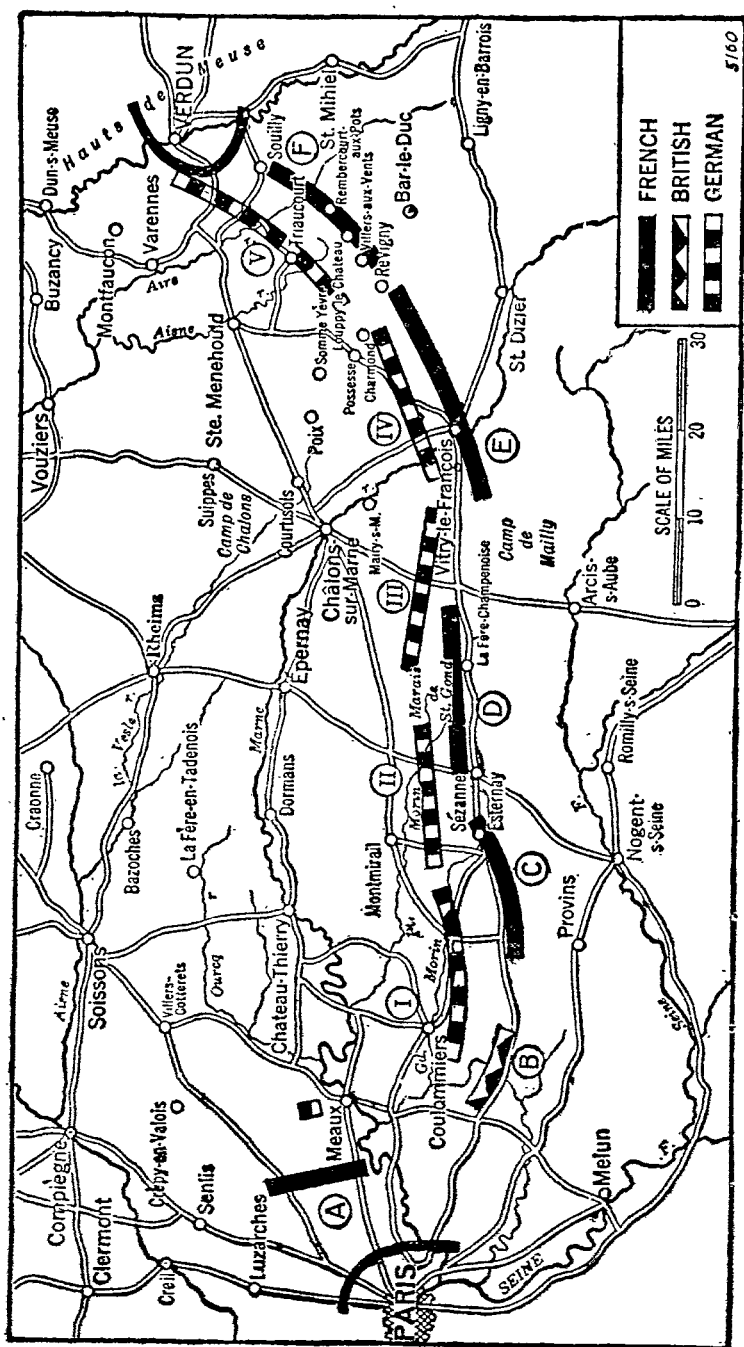
was facing eastward along a line northeast of Paris and about five miles west of Meaux.

In the last part of August the Ninth Army under Foch was being formed and was sent up to fill the gap between the Fifth and Fourth French Armies. On September 5 this Army lay facing north with its center near La Fère Champenoise.

Both these armies were to play important roles during the next few days.

15. VON KLUCK'S WHEEL TO THE SOUTHEAST

Von Moltke released von Kluck from the control of von Bülow on August 27 and von Kluck was directed by the Supreme Command to march west of the Oise toward the lower Seine, to cooperate with the Second Army and to protect the right flank of the armies. Thereafter, until the 30th, the movement of the First German Army was toward the southwest so that only a portion of the Ninth Corps followed Smith-Dorrien. After severe fighting the Sixth French Army retreated toward Paris. At 6:30 p. m., August 30, von Kluck was requested by von Bülow, in order "to gain full advantages of the victory," to "wheel inwards * * * pivoting on Chauny toward the line LaFère—Laon * * *." The First Army accordingly wheeled toward the Oise on the 31st through Compiègne and Noyon, and such action was confirmed by von Moltke (6). This movement once more brought the First Army in contact with the retreating British in the vicinity of Villers-Cotterets (30). Efforts on September 2d to envelop the British again failed and the latter on September 3 crossed the Marne. Von Kluck says "a chance to deal a decisive blow against the British Army was no longer hoped for, and it was therefore decided to move the two corps on the left wing, the Third and Ninth, in the general direction of Chateau-Thierry against the flank of the French (Fifth Army) retreating from Braisne-Fismes on Chateau-Thierry—Dormans in front of the Second Army" (30). During the night of September 2-3 Kluck received a wireless message from Moltke which stated: "The intention is to drive the French in a southeasterly direction from Paris. The First Army will follow in echelon behind the Second Army and will be responsible for the flank protection of the Armies" (30). At the time Kluck received this order he was far ahead of the Second and Third German Armies and in contact with the enemy. To have delayed for them would have meant inaction on Kluck's part for about two days and would have given an opportunity for the Allies to recover. So he continued to advance, taking a southeasterly direction from Senlis through Meaux. Flank protection was provided by the Fourth Reserve Corps at Senlis and by the Second Corps and Cavalry Corps near Nanteuil-le-Haudouin (31). It appears that Maunoury's army was not considered to be a serious menace. On September 5 the van of the First German Army was



MAP NO. 7

THE BATTLE OF THE MARNE, SEPT. 5TH

A—Mannoury

B—British

C—Franchet d'Espèrey

D—Foch

E—De Langle de Cary

F—Sarrail

I—Kluck

II—Bilow

III—Hausen

IV—Württemberg

V—Crown Prince

Note—The small black and white square above Meaux represents the Fourth

south of the Marne and beyond Coulommiers, facing the British Forces and the Fifth French Army (16). This was practically a disobedience of the orders of September 3-4 and, in view of Maunoury's strength and the British ability to renew the offensive, placed von Kluck in a critical situation.

16. GENERAL SITUATION ON SEPTEMBER 5, 1914

The Third, Fourth and Fifth French Armies and the British forces occupied the areas already indicated. All the French armies were in condition to assume the offensive. Maunoury's Sixth Army for several days had been in process of reorganization and reinforcement north-east of Paris under the supervision of Gallieni, and by the night of the 5th was not only superior in strength to the forces of von Kluck opposed to him but was promised further reinforcement. It was now in a position to attack the right flank and rear of the First German Army.

The Germans had no strategic reserves available in Northern France at this time. As a result of losses and detachment of corps for subsidiary purposes their forces had been much depleted by the time they reached the Marne and were there outnumbered by the French in the ratio of three to two or perhaps two to one (7). An attempt to reinforce the right flank from the left was made by ordering the Seventh and Fifteenth Corps and Seventh Cavalry Division to Belgium on September 5, but owing to the poor transportation situation these reinforcements did not reach St. Quentin till September 15 and so their use was lost to both flanks at a critical juncture.

During the first week of September a contest was in progress on the front occupied by the French after their defeat at Morhange. Co-ordinating their movements with the armies of the west, eight German corps under the Crown Prince of Bavaria and General Heeringen, acting near the decisive moments under the eyes of the Kaiser, attempted to force a passage through the gap in the French barrier fortresses between Toul and Epinal. Had this drive succeeded it would have reversed the decision of the Marne. Although too greatly depleted to reinforce the armies on the Marne, the French under De Castelnau repulsed the German attacks in desperate fighting during which the enemy suffered heavy casualties. This Second Battle of Nancy, which was decided on the 6th and 7th, was really a vital phase in the Battle of the Marne; its relative value must be recognized to appreciate the whole picture of the Marne campaign (14).

The condition of the British Forces at this time (September 5) is of interest. Sir John French stated that his army was "shattered" and it has been shown already that he was preparing to retreat south of the Seine (38). On the other hand General Maurice and John Buchan repeatedly declare that the British troops were in good spirits and that nothing was needed but rest, food and replacement of lost equipment

to create an effective fighting force (23) (70). The losses up to the end of the battle of Le Cateau had been about 10,000, but reinforcements were available to replace at least a part of these (23). The entire losses during August were set by Sir John French at 15,000 (78). The latter stages of the retreat had been comparatively easy and the Army was augmented by the arrival of the Third Corps. It would appear that the essential need was a more energetic commander.

On September 4 at 9 a. m. Gallieni wrote as follows to Maunoury:

"I shall give you your marching orders as soon as I know the direction of march of the British Army. Meanwhile be ready to march this afternoon so as to make an attack tomorrow, the 5th of September, east of Paris."

This was approved by Joffre, who at 4 p. m. issued the following order:

"(1) Advantage must be taken of the risky situation of the German 1st Army to concentrate against it the efforts of the Allied Armies on our extreme left. All preparations must be made during the 5th for an attack on the 6th of September.

"(2) The following general arrangements are to be carried out by the evening of September 5th:

"(a) All the available forces of the 6th Army northeast of Meaux are to be ready to cross the Ourcq between Lizy and May-en-Multien (north) in the general direction of Chateau-Thierry. The available portions of the 1st Cavalry Corps which are close at hand are to be handed over to General Maunoury for this operation.

"(b) The British Army is to establish itself on the line Changis-Coulommiers facing east, ready to attack in the general direction of Montmirail.

"(c) The 5th Army will close slightly to its left and take up the general line Courtacon-Esternay-Sezanne ready to attack generally speaking from south to north. The 2d Cavalry Corps will secure connection between the British Army and the 5th Army.

"(d) The 9th Army will cover the right of the 5th Army by holding the southern outlets of the St. Gond marshes and by placing part of its forces on the plateau north of Sezanne.

"(3) These different armies are to attack on the morning of the 6th of September.

"As to the 4th and 3d Armies, they will be warned on the 6th of the great attack which is about to take place on their left. In consequence the 4th Army is to cease moving southward and must second the operations and take advantage of them by holding the enemy in check and for this purpose will get into contact with the 3d Army which passing out to the north of Revigny will carry on the offensive westward."

The credit for the initiation of the offensive plan is still disputed by partisans of Joffre and Gallieni.

17. THE BATTLE OF THE OURCQ

This conflict was carried out mainly by the Sixth Army, which is not one of those assigned to this study, but it will be described briefly because of the British participation to the south and in order that its bearing on the actions of the Third, Fourth and Fifth French Armies may be appreciated. Fighting began on September 5. On the 6th a general attack by the French Sixth Army was made and at nightfall General Lamaze's corps had gained several miles of ground to the line Chambry-Barcy-Marcilly. Meanwhile the Seventh French Corps, attacking in the direction Acy-en-Multien, had by evening reached a line Marcilly-Nantreuil. Von Lochow of the Fourth German Reserve Corps

early asked for help and von Kluck sent a part of the Second Corps and other troops. At night the French had gained a considerable tactical success (8). On the morning of the 6th Sir John French's order stated: "After a most trying series of operations, mostly in retirement, * * * the British forces stand today formed in line with their French comrades, ready to attack the enemy * * * I call upon the British Army in France to show now to the enemy its power, and to push on vigorously to the attack beside the Sixth French Army" (35). The British forces moving northeastward from behind the Forest of Crecy toward the Grand Morin were in high spirits (35). About noon cavalry, supported by infantry, was encountered. At this time the German advance was not being pushed vigorously and later a general retreat appeared to the British to be in progress (32). The German Fourth Corps had been ordered to recross the Grand Morin at Coulommiers and to proceed toward La Ferte-sous-Jouarre on the Marne. By evening the British had advanced about eight kilometers and were on a line running across the Grand Morin with the right at Dagny. The Second and Fourth German Corps were withdrawn north of the Marne.

On September 7 the Sixth French Army attacked at daylight, encountering stiffening resistance but gradually progressing and nearing the Ourcq. The German Second Corps moved to the support of the Fourth Reserve Corps, and the Fourth Corps to a position to attack across the line Rozoy-en-Multien—Trocy. At 11.15 a. m., von Kluck, alarmed by French activity, recalled the Third and Ninth Corps, which were supporting von Bülow's right, and sent them in the direction of the crossings of the Ourcq at La Ferte Milon and Crouy with orders to be ready for action on the Ourcq by daylight of the 8th. Only cavalry, assisted by Jaegers and small amounts of artillery and infantry were left to oppose the British, but these carried out so effective a delaying action that by nightfall of the 7th they still held the north bank of the Grand Morin.

On the 8th Maunoury renewed the attack, though now no longer numerically superior. The Germans counter-attacked vigorously and by evening the Sixth French Army had been checked and von Kluck was preparing on the 9th to make an enveloping attack with the Ninth Corps and other troops from the general direction of Betz (41). The British on this same day continued to advance northwards in the direction of Nogent—d'Artaud to the Petit Morin, opposed by Marwitz cavalry assisted by infantry; at nightfall the forces had reached the Marne from Signey—Signets to La Ferte-sous-Jouarre and were approaching Chateau-Thierry.

During the morning of the 9th von Kluck was forcing back the left wing of the Sixth French Army in spite of reinforcements hurried up from Paris. Reinforcements from Maubeuge were on the way to Kluck. The rest of Maunoury's army was holding or advancing, but

his general situation was serious and preparations were being made for a retreat (45). The movements necessary for the battle had resulted in a wheel to the east and north of almost all of Kluck's army, except Marwitz cavalry, so that instead of facing nearly south, as he did on the 5th, he now faced west with his right flank swinging to the southwest. The British on the morning of the 9th found that the bridges west of Chateau-Thierry had not been destroyed and by 9 a. m. the Second Corps had crossed the Marne and one brigade was four miles beyond the river on the Chateau-Thierry—Lizy road (24) (72). The First and Third Corps had not advanced so far. About 10:20 a. m. Kluck learned that British forces were north of the Marne and dispatched von Linsingen toward the line Crouy—Coulombs to face them (41). By night of the 9th the entire British Army was across the Marne on a line from Chateau-Thierry to the Ourcq.

About noon of the 9th Lt. Col. Hentsch, an officer of von Moltke's staff and apparently vested with authority to speak for him, coming from the headquarters of the Second Army, visited von Kluck's Chief of Staff and directed withdrawal of the First Army in the general direction of Soissons—Fere-en-Tardenois (41). He stated that the efforts of the Fifth, Sixth and Seventh German Armies had been unsuccessful, that the Second Army was already in retreat, and that all the forces were to move back. Colonel Hentsch was never seen by von Kluck, though the latter was close at hand. Kluck's order for withdrawal was issued on the 9th and in the evening the columns were on the march (42). At this time the withdrawal of the Second Army was also under way. These withdrawals ordered on the 9th resulted from the check of the Fifth, Sixth and Seventh German armies and the retreat of the right of the Second Army; they were not due to the attack of the 42d. Division by Foch, which attack had made little headway on the 9th (9). The influence of the British forces has been greatly depreciated by Frank H. Simonds (15) and equally praised by Gen. F. Maurice in the second edition of his "Forty Days" (45)*. An intermediate view is nearer the truth. A more rapid advance by Sir John French appears to have been possible and would have materially relieved Manuoury.

* "Much has been written about the miracle of the Marne, and I yield to no one in my admiration for Foch's generalship and cool judgment which, after days of almost intolerable strain, he displayed in seizing at once upon the first opportunity which presented itself to attack, but, though he did not know it there was nothing left to attack. It was not his attack but his defense which contributed to the victory. * * * But I am convinced that history will decide that it was the crossing in the early hours of the 9th by the British Army which turned the scale against von Kluck and saved Maunoury at a time of crisis. At the time when we were crossing the Marne the French Sixth Army was very near the limits of its endurance, and * * * Gallieni had begun to take the measures necessary to prepare for a retreat. * * * The left of the Fifth French Army did not reach the Marne until the evening, and therefore can hardly have affected the German general's decision of the forenoon. Von Bulow's evidence on the point is conclusive. He says: 'As the enemy crossed the Marne in several columns, between La Ferte-sous-Jouarre and Chateau-Thierry, early on the morning of September 9, there could be no doubt but that the tactical and general

18. BATTLE OF LA FERRE-CHAMPENOISE AND OTHER
FIGHTING ALONG THE MARNE AND TOWARD
VERDUN, SEPTEMBER 6-10, 1914

General Joffre's order of September 5 directed the Fifth French Army to attack September 6 toward the north, maintaining contact with the British by means of the Second Cavalry corps. Both Germans and French attacked at daylight on the 6th and violent fighting at once ensued which ultimately resulted in an advance of the French, who by nightfall were on a line Courtacq—Esternay—Villeneuve—les-Charleville. On the evening of the 6th von Kluck's Third and Ninth Corps had been handed over to von Bülow for covering his right flank. On this same day (September 6) von Hausen's Third Army had attacked Foch's Ninth Army, which was on the right of the Fifth French Army, and had driven it back somewhat.

On September 6 the Fourth French Army attacked the German Fourth Army and made some advance.

The Third French Army which was to maintain contact with Verdun and the Fourth French Army, operating against the flank of the Fifth German Army if it moved south, had been weakened by the dispatch of the Fourth Corps to Maunoury, but this was later replaced by the Fifteenth Corps from the vicinity of Nancy. During the 6th of September the Third French Army held its own except on its left flank and at nightfall was on a line Vassicourt—Marre. Meantime on the same day a German division and other forces from Metz were attacking Fort Troyon, across the Meuse in Sarraill's rear. This attack kept up for five days without success.

On September 7, as von Kluck's Third and Ninth Corps were withdrawn from von Bülow, the Fifth French Army was able to advance about six miles to the line La Ferte—Gaucher—Trefols. The Ninth French Army was now being violently attacked by von Bülow and von Hausen, in the hope of reaching a decision by breaking Foch's center, but it held its own with the assistance of the Tenth Corps from the Fifth Army. The Fourth French Army was also violently attacked and its right, driven back by night beyond Sermaize, was in danger of separation from the Third Army. The Third French Army was not seriously engaged. The fall of Maubeuge on this day (September 7) released troops for reinforcing the Germans and permitted better use of the railroads for supply.

September 8 was recognized by the Germans as likely to be the decisive day and was so proclaimed (46) on the evening of the 7th, at

situation made the retreat of the First Army necessary, and that the Second Army must also retreat if its right flank were not to be completely enveloped.' It is therefore not possible to arrive at any other conclusion than that it was the menace of the British advance to his flank, which precipitated von Bülow's decision, caused the Germans to begin their retreat, and saved Maunoury at a time when he was in grave danger" (45).

which time the Battle of the Ourcq appeared to be turning in favor of von Kluck and the British were being detained by cavalry forces and were under the necessity of replacing most of the bridges on the Marne if they were to cross. On September 8 the Fifth French Army advanced and forced the crossing of the Petit Morin in face of considerable resistance and by night the Tenth Corps was facing eastward and threatening von Bulow's right flank. The British continued to advance and were near the Marne. The Ninth French Army had been very heavily attacked and driven back in places and by nightfall seemed on the verge of disaster. The Fourth French Army in severe fighting had been able to hold its own, thanks to the arrival of the Fifteenth and Twenty-first Corps from the eastern frontier. The Third French Army maintained its defensive and filled in the gap between its left flank and the Fourth Army. French troops from Nancy were arriving in the Woevre district to oppose the Germans operating against Fort Troyon.

September 9 witnessed the failure of the German plan for destroying the French Army. The Battle of the Ourcq was progressing favorably for von Kluck but the British crossed the Marne in the forenoon and advanced, threatening to separate him from the Second German Army (48), while the Fifth French Army, part of which was now north of the Marne at Chateau-Thierry, was pushing back von Bulow's right flank, increasing the existing gap between the First and Second German Armies. In the Ninth French Army the Eleventh Corps was being driven back, as was the 42d Division until relieved by the Tenth Corps of the Fifth Army. The 42d Division was then withdrawn to form an army reserve and about 5 p. m. was ordered to counter-attack in the direction of LaFère—Champenoise, but had not proceeded far before darkness (25).

The left of the Fourth French Army, reinforced by the Twenty-first Corps, was ordered on September 9 to attack for the purpose of relieving the pressure on Foch. This resulted in driving back the enemy. The positions of the center and right of the Fourth Army remained unchanged.

The Third French Army remained inactive during the ninth except that an advance was made by the Fifteenth Corps towards evening.

On this day (September 9) the retreat of the German Armies began, as already indicated in discussing the Battle of the Ourcq.

On the morning of September 10 Maunoury's forces were aware of the German retreat and advanced, driving out German rear guards and reaching by nightfall a line running east and west through La Ferte-Milon, while von Kluck's army spent the night in the vicinity of Villers-Cotterets. The British pursued without serious fighting and by evening had reached the Ourcq, at which time the Fifth French Army's cavalry corps was north of the Ourcq on a line Oulchy-le-Chateau—Fere-en-Tardenois and in contact with the British on its left.

September 10 saw the completion of the attack by the 42d Division, which Foch had launched late in the preceding afternoon. This attack of the 42d Division was heralded by the earlier writers as the deciding factor in the Battle of the Marne and the results of it have been depicted in glowing colors by Frank H. Simonds (17). Later information from the German commanders indicates that the retreat of the German armies had been ordered before Foch started this counter attack on the 9th and that the 42d Division encountered only rear guards. This does not detract from the daring nature of the attack in the face of a desperate situation when the fact that the Germans were withdrawing was unknown to the French. By a rapid advance the right of the Ninth Army reached a line west of Vitry-le-Francois at nightfall, while cavalry was near Chalons. The left flank of the Tenth Corps advanced more slowly to the north of St. Gond Marshes.

At dawn of the 10th de Langle's Fourth Army attacked but was unable to capture Vitry-le-Francois. The Third Army made some advances and the Germans suffered heavy losses in counter attacks.

19. THE BATTLE OF THE MARNE

Under this name are included the connected series of engagements in the area between Paris and Verdun which took place from September 5 to September 10, 1914, and which have just been described. Tactically the battle was somewhat of a disappointment, since the Germans were able to break off the action at their own time and to retire in good order with no serious losses of prisoners or guns. Strategically the battle was of immense importance and may be ranked as one of the decisive battles of the world (49). It marked the turn in the tide of French defeat, and for the Germans was the collapse of the plan to reduce France in six weeks, a conception on which the fate of the Empire had been staked (71).

20. THE ADVANCE OF THE ALLIES TO THE AISNE

The German right wing fell back in haste but in good order and by September 12 was behind the Aisne on the heights along a line Attichy-Soissons-Vailly. The French Sixth Army followed through the Forest of Compiègne and crossed the Aisne on the 12th and 13th (43) (49). Some of the British forces crossed on the 12th (43) and by nightfall of the 14th all three corps had completed bridges and passed over in the face of considerable opposition (49) (76). The Third French Army was so exhausted after the Marne that the pursuit of the Fifth German Army was not pressed. The Allied center did not meet much opposition in its advance to the Aisne (49).

21. DISCUSSION OF THE MASTERLY STROKES AND THE ERRORS, AS REGARDS COMMAND, DURING THE ABOVE OPERATIONS

(A) GENERAL AND MAJOR CONSIDERATIONS

It may be open to question whether Germany made a fundamental mistake in violating the neutrality of Belgium; certainly this act turned against her the sentiment of most of the civilized world and determined the immediate entry of Great Britain into the conflict. Having decided that violation was to be carried out, and having selected the main French forces for the objective (as appears to have been the case) every effort should have been directed toward making the offensive absolutely effective. This was not done and the principles of mass and of economy of force were violated from start to finish. Large forces were placed in Alsace-Lorraine and continued there, taking the offensive when the efforts in that theatre should have been confined merely to holding the French or else to enticing them on until they were so committed that it would be impracticable to withdraw corps to assist their left flank. By so much as the German left flank was initially strengthened the maneuver flank (right) was depleted. The primary German strategical defect was in taking the offensive on both flanks (51). The Germans still further weakened their right by detaching active corps for the siege of Antwerp and of Maubeuge, and by sending two corps with a cavalry division to East Prussia on August 25, at which time Von Moltke appears to have considered that the decisive battles in the west had been fought and won. The victory at Tannenberg was won without the aid of the corps from northern France, so their services were lost at a critical period on two fronts (55). There was no depth in the advance of the German right wing, no strategic reserves and no provisions for replacing losses (57). Overconfidence was manifest. In the earlier stages of the campaign Von Marwitz's cavalry was worn out in fruitless reconnaissances and was not able to exert the influence it should have in the attempt at enveloping the British near Mons and Le Cateau (53).

The German advance through France also violated the principle of unity of action. The Supreme Command was over 100 miles in the rear and owing to poor means of communication could not keep in touch with the movement of the armies and prevent overlappings or separations (52) (54). There were no group commanders. Von Kluck, together with Marwitz's cavalry, was for a time (August 17 to August 27) under the authority of von Bülow, but von Kluck appealed frequently to the Supreme Command. Cooperation between armies, rather than their coordination by a single mind, seems to have been the guiding principle. In continuing to advance southeast between September 3 and 5 von Kluck disobeyed orders and his troops were overlapping the right flank of the Second German Army.

The vagueness and vacillation which characterized the Supreme German Command was doubtless in large part due to the ignorance of the true condition of the armies, which resulted from the poor communications (62). The height of absurdity in command seems to have been reached when Lieut. Col. von Hentsch could order the retreat of a victorious army without consulting its commander. To what extent von Hentsch was responsible for the retreat and to what extent it had already been decided on by von Kluck before his arrival are still in dispute (73).

The principle of surprise was well carried out by the German Supreme Command; the French for a long time had no idea of the strength, position and direction of movement of the enemy in Belgium and northern France, particularly as regards advances west of the Meuse. In carrying out the principle of security the Germans protected their main concentrations in the north with an impenetrable cavalry screen.

Celerity of movement was of paramount importance to the Germans at the outset. It is thought that two or three days were lost in starting the armies through Belgium. The capture of Liege was delayed through not having heavy howitzers ready at the start. Again overconfidence seems to have led the Germans astray, as they apparently expected little resistance at Liege (56) (83).

The principle of simplicity was violated in the von Moltke plan, which contemplated, under certain contingencies, a shift of troops from Alsace-Lorraine to the right flank. As already shown, this transfer, when tried, could not be effected in time to be of use at the crisis.

The French and English violated the principle of security by their advance into Belgium. Joffre was entirely in the dark as regards the strength and dispositions of the Germans and the distance to which their right wing extended westward; attempts to gain information through the operations of Sordet's cavalry failed. The ultimate result was that the Fifth French Army and the British Expeditionary Force came in contact unexpectedly with overwhelming numbers of the enemy and narrowly escaped destruction. The French were likewise ignorant of the German strength in the Ardennes.

Unity of command between the French and the British forces was very unsatisfactory. Indeed there did not even appear to be hearty cooperation, particularly at Mons and again about August 30, during the retreat to the Marne; this matter has already been discussed under subhead 9 of this article and in the footnote under subhead 14.

With reference to the propriety of an initial offensive in Alsace-Lorraine, it may be said that the French were committed to the principle of the offensive and that political considerations required an early attempt to regain the lost provinces. As regards the purely military considerations the following opinion of Gruard is of interest:

"The French High Command gave proof of a complete lack of the strategic

sense, otherwise it would have understood that the decisive theatre of operations was not in the east but on the frontier of Belgium" (6).

Guard's further criticism that "the French did not apply the principle of economy of force or keep a strategic reserve" (60) seems to me somewhat unjust, since Joffre provided such a reserve originally, viz., the Fourth Army, and subsequently the Sixth. It was not Joffre's fault that pressing demands necessitated the employment of these armies almost immediately. Economy of force was well exemplified by Joffre's later operations, for with inferior forces he contained strong German armies in the Alsace-Lorraine theatre, withdrawing to his left flank and center the corps necessary to secure victory at the Marne.

On August 25 Joffre gave orders with a view to making a stand, and ultimately assuming the offensive, on a line Vermaul—Moy—Laon—Craonne—Grand-Pre—Verdun. This stand was prevented by the rapid advance of the enemy, the too great retirement of the British and the wide gap between the Fifth and Fourth Armies. It was to fill this gap that the Ninth Army was organized. Having failed to carry out his plan at this point, Joffre continued retirement, awaiting a favorable opportunity to assume the offensive.

Before and at the Marne Joffre acted in accordance with the principle of mass and economy of force, carrying out a step by step retreat until he could concentrate superior strength at the critical time and places. The excellent railroad facilities and the fortunate outcome at Nancy prior to the crisis on the Marne contributed to accomplishing this object. It is estimated that during the battles between Paris and Verdun on September 6 to 10 Joffre outnumbered the Germans three to two, or perhaps even two to one. The Germans had no strategic reserves on which to depend and their effort to move troops from Alsace-Lorraine on September 5 was ineffective because of slow transport. The French and British not only had the numbers but they also had the morale in spite of their two weeks of defeat and retreat. They operated under good and coordinated leadership, while the German armies did not then cooperate well and their supreme command had broken down because of indifferent means of communication. They had also outrun much of their heavy artillery and the supply system was not working well, partly because of the excellent and unexpected defense of Maubeuge, which blocked important railways.

Contrary to earlier beliefs, the Allied forces in France were at the outset not greatly, if at all, outnumbered by the Germans (65) (74). German reserve divisions, however, were superior to French reserves in training and armament. In heavy artillery, motor transport, use of airplanes and tactical training the invaders had a real advantage (65). To envelop great armies without a marked superiority of numbers is a forlorn hope, and the German plan to accomplish this was born of overconfidence (85).

Both in the general plan for the war and in the subsequent operations the German command was unable to gauge the racial psychology and morale of its opponents. This was notably the case as regards the attitude of Belgium, the degree of resistance at Liege, the reaction of Great Britain and the "come-back" of the French and British forces after the retreat to the Marne.

It seems to me, as a general conclusion, that the fundamental failure of the German war plan from a purely military point of view was the desire to "play safe" on all fronts and to place preponderating forces on none. It would have been sound strategy to permit East Prussia to be overrun if France could thereby be beaten promptly, and to allow Alsace-Lorraine to be deeply invaded if an early decision could be obtained on the German right flank. In both instances, particularly in the case of East Prussia, public opinion probably necessitated action opposed to sound military policy (82).

The above criticisms are made in the light of present knowledge and do not necessarily reflect on the actions of the German and French high commands which, at the time, were ignorant of many matters now made clear.

(B) SPECIAL AND MINOR CONSIDERATIONS

The Fifth French Army had been sent into Belgium without protection for its right flank and rear. Lanrezac was ordered to advance across the Sambre on August 20 but did not do so because his army was not complete. At the Battle of Charleroi Lanrezac's method of attempting to hold the Sambre was faulty. He did not intrench nor did he destroy the bridges (58). Neither did he prepare the Meuse for defense which, if done, would probably have prevented the capture of Dinant and would have left the First Corps available for attacking von Bulow; as it was, this corps was not available at either point at the decisive moment. At Mons the British did better in their defense and retreated as a result of isolation and threatening envelopment. In the combined battles of Charleroi and Mons the German high command lost an opportunity to envelop and destroy the two armies. Had the frontal attacks been delayed while the envelopment of both flanks went on, such an outcome would have been probable. The failure of the Germans was apparently due to faulty information; von Bülow considered that only weak forces were in front of him at the Sambre and attempted to run over them; von Kluck believed that the British force extended much further to the west than it did and that it was coming from that direction, so he allowed his Second and Fourth corps to march too far southwest (62). As already stated, the great development of German strength came as a complete surprise to both the French and the British.

Both at Mons and at Le Cateau Kluck failed to employ his cavalry

successfully for enveloping the British when conditions were most favorable for the purpose. At Mons, von Marwitz's cavalry was absent on a distant mission and at Le Cateau it was tired out. Le Cateau was von Kluck's most conspicuous and indefensible failure (69). If von Kluck's intent was to smash the British by frontal attacks in these two battles he violated the principle of mass in executing his plan, since he brought his forces up in dribbles instead of waiting till they could make a powerful combined attack.

The British retreat from Mons was ably conducted and the stand of Smith-Dorrien at Le Cateau was notable for the success with which it was carried out (69) (79). Sir John French pays high tribute to the coolness, intrepidity and determination of Smith-Dorrien as a commander (63). An outstanding feature of the retreat was the excellent work of Allenby's cavalry division.

The retreat of the Fifth French Army was well handled by Lanrezac (68) who, at the Battle of Guise, materially aided the later retreat of the British. Lanrezac was relieved on September 3, apparently because of his criticism of the French High Command and the British. He alone of the acting command appears to have divined the German plan and to have had the courage to oppose the views of his chiefs (65).

The offensive of the Third and Fourth armies in the Ardennes was premature and without definite objective as a major effort (66). It was in difficult country, against a superior enemy and was not supported by adequate artillery (66). The French were outnumbered by the Germans (80). This advance, had it been successful, might have checked the German advance through Belgium, but the French should have realized that the Germans would not leave this region inadequately protected (81).

At the Battle of the Marne it has been claimed that the attack by Maunoury's army was premature (59) and that the advance by the British, who were opposed by cavalry forces almost exclusively, was too slow (60) (61). In extenuation of the latter fault, it is stated that the British did not receive the orders to attack until they had completed their day's march on the 5th and therefore their army was much further away from the theatre of action than the French Staff expected it to be (60). Poor communications handicapped the French as well as the Germans.

As regards the propriety of fighting the Battle of the Marne in the manner in which it was carried out, the following view of Guard's is of interest:

"Joffre's attempt to envelop the German right a la Schlieffen is condemned as 'chimerique' with the weak force of six, including one active, divisions with which Maunoury was asked to carry it out: 'he should have had at least 80,000 men more.' When it was obvious on the 8th, if not on the 7th, that envelopment must fail, it should have been abandoned and all available reinforcements sent to Franchet d'Esperey, who with the B. E. F. was making progress. Bülow could then have been rolled up, and Kluck dealt with afterwards" (60).

It seems to me that this criticism is unfair and that Maunoury on the 8th was in no position to release any of his forces for the purposes indicated by Gruard. The failure to exploit the victory of the Marne more fully was in part due to the exhaustion of Maunoury's Sixth Army (which had been so nearly beaten and which had no fresh divisions to pursue von Kluck,) and in part to the skill and rapidity of the German retreat when withdrawal had once been decided upon.

On August 30 General Ruffey was succeeded by General Sarraill, who during the retreat was ordered to keep clear of the entanglement of Verdun. However, Sarraill realized the value of the fortified heights of the Meuse and when he took up his position in the early days of September he kept his right in touch with the fortress, a decision which meant much for the future success of the campaign (67).

In view of the contention that fortresses are useless in modern war it may be said that permanent fortifications caused the Germans much trouble. Vital delay occurred at Liege. Antwerp, Namur and Maubeuge absorbed large forces of first line troops for their investment, and the prolonged resistance of the latter seriously interfered with the German supply system (79). Verdun formed a secure pivot on which the French Army could wheel in the retreat to the Marne. Finally the existence of the French eastern fortresses largely determined the German plan of campaign through Belgium (79).

The principle of strategic movement was excellently carried out by the First German Army which marched with extreme rapidity for so large a force over so long a period. This rapid flanking movement by von Kluck was an important factor in causing the precipitate French and British retreats. The principle of movement was particularly illustrated by the wheel of von Kluck's corps in his efforts to outflank Maunoury at the Battle of the Ourcq. A violation of the principle of strategic movement is seen in the delay to the advance of the main German forces in Belgium as a result of failure to bring up heavy howitzers at the outset for the reduction of Liege.

Numerous instances of strategic shifting of troops on a large scale are found in Joffre's maneuvers at and before the Marne. These moves were made possible by the excellence and flexibility of the French railroad systems, as adapted to war conditions. The victory was due largely if not entirely to the rapidity with which divisions and corps from the eastern frontier were transferred to critical points on the left and center of the long battle line. Gallieni's dispatch of reinforcements to Maunoury by taxicab was a spectacular illustration of the same principle.

The principle of surprise was illustrated by Maunoury's attack on the 1st German Army's right flank at a time when von Kluck appears

to have believed that he was not menaced in that direction by any large force.

The Germans appear to have been surprised by the accuracy and volume of the British rifle fire at Mons and believed that their opponents were supplied with great numbers of machine guns (86).

The use of the heavy howitzers for the reduction of fixed fortifications came as a surprise not only to the French and Belgians but to the whole world.

The question arises as to whether the French forces should have been formed into Army groups for the purpose of securing greater co-ordination and unity of action. A group organization of the Third, Fourth and Fifth French Armies and the British forces, under one commander, might have prevented the isolation of the British at Mons, the flanking of Lanrezac at Dinant and the opening of gaps between the armies during the retreat to the Marne. Political considerations, however, would probably have prevented the incorporation of the British. The lack of group command during the retreat was largely counterbalanced by the intimate control exercised by Joffre, who was close to the scene and at times conferred personally with his army chiefs. He was in touch with what was going on along the whole front of his forces,—a circumstance which was in marked contrast to von Moltke's apparently vague knowledge regarding the movements of the German armies.

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Air Service Operations in Coast Artillery Service Practice

*By Captain I. H. Edwards, A. S., and
1st Lieutenant G. H. Burgess, A. S.*

REPORT OF THE COMMANDING OFFICER, KINDLEY FIELD, CORREGIDOR



THE following report is submitted of Air Service operations carried on in conjunction with target practice of the coast defenses of Manila and Subic Bays over the period March 19-April 17, 1923.

From the standpoint of the Air Service, these exercises were highly satisfactory. Twenty-two missions were successfully conducted in cooperation with the Coast Artillery, nineteen of which were adjustment of fire problems and three, problems with Battery Commanders in the tracking of seaplanes flying on an imaginary Battery Target line. During the exercises but one forced landing occurred, due to an engine failure. This seaplane was carrying the safety officer during the long-range firing of Battery Smith and was able to return to the airdrome before landing.

Two-way radio communication was maintained throughout every problem without a single radio failure.

ORGANIZATION AND EQUIPMENT

(a) The operations were carried out under the direction of the commanding officer of the Second Observation Squadron, which organization functioned in accordance with prescribed Tables of Organization. Due to shortage of commissioned personnel, one officer acted as operations officer and flight commander, and one officer as communications officer and liaison officer. Each mission was covered by an operations order, and reports were required of each pilot and observer upon completion of mission.

(b) Four flying boats—type HS2L—were used to carry out all missions. While these boats functioned mechanically as well as can be expected within the limitations of that type, and while they were satisfactory for purposes of giving training and practice to personnel engaged in the exercises, this type of plane is obsolete and

would be of no value under war-time conditions. The low ceiling of the HS2L resulted in an unnecessary 30 minutes flying in every reglage mission and forced the observer to carry out his mission at a much lower altitude than was desirable. Their lack of manoeuvrability subjected the pilots to undue strain and fatigue in carrying out a mission that extended over two hours or more.

Each flying boat was equipped with a Navy spark transmitting set, type CP-1110, and receiving set, type SCR 75. There were no radio failures during the entire practice. Each plane carried an extra set box, vacuum tube and antenna so that in case of failure of any of these parts in the air, substitution could be made without returning to the airdrome.

Personnel.

(1) The commissioned personnel of the squadron during the practice consisted of:

Commanding Officer	Pilot
Adjutant	Pilot and Observer
Operations Officer and Flight Commander	Pilot and Observer
Communications and Liaison Officer	Pilot and Observer
Engineering Officer	Pilot
Transportation Officer	Pilot
Two Observers, "Heavier-than-air."	
Two Observers, "Lighter-than-air."	

The two observers, "Lighter-than-air" were not used since they were not qualified in two-way radio communication.

All pilots were made available during the practice regardless of other duties.

The two observers, "Heavier-than-air" were temporarily attached to the organization from Clark Field and, assisted by two pilots who are also qualified as observers, carried on the observer's work. The authorized commissioned strength is 31 officers.

(2) The enlisted strength present for duty during the practice was 86. Fourteen additional men, including 4 radio men, were detailed on temporary duty from Camp Nichols, making a total of 100 enlisted men. The authorized enlisted strength of this organization is 132. The strength of the technical departments concerned in the practice viz: Flight, Communications, Engineering, was as follows: Flight, 20; Engineering, 7; Communications, 6. The authorized strength of these departments is: Flight, 19; Communications, 9; Engineering, 28. Experience has shown that the handling and maintenance of this type of flying boat requires twice the per-

sonnel necessary for observation airplanes. However, as there were occasional days when no firing practice was conducted, and by taking advantage of Sundays and holidays, this reduced strength was sufficient to maintain the equipment in operating condition.

RECOMMENDATIONS

(a) It is recommended that the procedure outlined in "Procedure Covering Use of Aerial Observation in Conjunction with the Coast Artillery in the Philippine Department" be changed in accordance with recommendations of communication officer, attached. No change is recommended in prescribed system of communication by panels. The present panel code is as complete as could be desired. Whenever necessary because of some peculiar problem, special panel signals can be arranged, but it is not deemed necessary that such special panels be incorporated in the standard code.

(b) It is also recommended that consideration be given the advisability of placing under control of the Air Service communications officer all ground communications with the observation airplane. It is now required that ground communication with the plane should be maintained by the Coast Artillery. However, during this practice the Air Service communications officer conducted the ground station at the battery (reference the attached report of Communications Officer). In Coast Defense Forts where batteries are in fixed positions and aerial communications could be handled by an Air Service officer, this plan would be conducive of much more satisfactory results. It can not be expected that Coast Artillery Communications Officers should be as familiar as Air Service Communications Officers with the special difficulties of aerial communication between the plane and the ground.

In its effort to perform satisfactorily its function during the recent target practice, the Air Service was greatly assisted by the cooperation and interest evidenced by the Coast Defense and Artillery Commanders, and by the various fire command and battery commanders.

The confidence which was shown by these officers in the accuracy of the data transmitted by the observer resulted in the successful conduct of two special problems in firing at long range at targets invisible from all terrestrial observation stations.

(Sgd.) I. H. EDWARDS,

Captain Air Service,
Commanding.

REPORT OF THE COMMUNICATIONS OFFICER

The following is a report of the Air Service operations conducted in conjunction with the annual service firing practice held at Fort Mills, Corregidor, P. I., and auxiliary fortifications during the period from March 19 to April 17, 1923.

Acting upon instructions from the Air Officer, Philippine Department, the undersigned, on February 19, 1923, reported to the Commanding Officer, Coast Defenses of Manila and Subic Bays, for a conference pertaining to the nature and extent of the cooperation desired of the Air Service during the service practice to be held in the months of March and April, 1923.

As a result of the above conference the following recommendations were made, approved and subsequently carried out:

- (a) That all Air Service operations be undertaken by Flight "A", Second Observation Squadron, Kindley Field, employing the Type HS2L Flying Boats available at that station. (During the practice in the year 1922 the DH4B airplanes were used, operating from Camp Claudio, Paranaque Beach.)
- (b) That sufficient commissioned and enlisted personnel be temporarily detailed from other organizations in the department to augment the organization at Kindley Field, in order adequately to meet the requirements.

The personnel drawn from other organizations comprised the following:

- (a) One officer to act as Communications Officer.
- (b) Two officers to act as aerial observers.
- (c) One non-commissioned officer as Chief Radio Mechanic.
- (d) One non-commissioned officer as Chief Radio Operator.
- (e) Two radio mechanics.
- (f) Ten enlisted men to assist in the maintenance and manoeuvring of seaplanes.

All communications personnel reported to the Liaison Officer on March 4th for a ten-day training period, during which practice was held in all phases of the work to be undertaken. The four seaplanes in commission were overhauled and refitted with radio equipment and new devices specially constructed, designed to preclude as

far as possible any failure in communications and to provide the utmost comfort and convenience for the observers. Following the ground preparation, utilizing the practice equipment and miniature target range, the observers were given air work with a view to developing two-way radio communication to such a degree as to obviate the necessity for using panels except in extreme emergency. A two kilowatt, quenched spark transmitter was used at the Kindley Field radio station and the Type CP-1110, one-half kilowatt, Navy spark transmitter in the seaplanes, which permitted of satisfactory two-way communication over a thirty mile radius under average atmospheric conditions. Authority was obtained from the Department Signal Officer for the use of the Signal Corps radio station at Fort Mills for the fort radio station but upon inspection and after several tests, the station was found unsuitable owing to poor tuning devices and low power radiation.

Two days prior to the start of the actual firing, simulated problems were executed by the observers in the air, using the procedure prescribed for use of Aerial Observation in conjunction with Coast Artillery.

The actual firing problems commenced on March 19th and terminated on April 17th.

The Air Service furnished observation during every problem fired, with the exception of one or two small caliber problems, considered of insufficient importance to warrant air observation. During the entire practice, only two individual shots fell unobserved from the air, due to misinformation concerning the time of opening fire, combined with an accident in launching the seaplane.

The two-way radio communication was maintained without interruption throughout the practice, not a single failure during the twenty-two missions performed. Communication by panels was resorted to only during two special problems, where it was necessary to transmit to two airplanes simultaneously.

Due to the fact that Coast Artillery personnel was mainly Filipino and had not been fully trained in Air Service procedure it was deemed advisable, in view of the limited time, to permit Air Service personnel to operate the fort radio station for airplane communication.

The fort radio station consisted of the following arrangement:

- (a) The transmitting set was established at the Kindley Field radio station.
- (b) The receiving set was a portable outfit erected daily at the battery firing.

- (c) The transmitting set and receiving set were connected by a special telephone line furnished by the Artillery Engineer daily.

This arrangement virtually amounted to providing a complete radio station in the battery commander's station. The arrangement was decided upon in conference with the Coast Artillery Commander and several battery commanders. Its advantages may be stated as follows:

- (1) Direct reception from airplane at battery commander's station, eliminating time required to relay reports of shots by telephone.
- (2) Maintenance of communication with airplane (by use of panels) in the event of failure of telephonic communication with the transmitting set or of the transmitting set itself.

The portable receiving set comprised two SCR-75 sets, suspended by rubber shock-absorbers in a wood frame, arranged to avoid damage through gun shock. The connections permitted of quick change from one set to the other in case of failure. No failure of either receiving set occurred.

The telephonic communication between batteries and the transmitting set at Kindley Field was excellent throughout the practice. This communication was served by a special line connected through the fire control switchboard and in the event of failure, recourse was possible through the regular switchboard.

The Air Service Communications Officer took station with the battery commander or fire commander during each problem, directing the movements of the seaplanes as well as delivering the reports of observations received. There appears to be no question as to the function of the Air Service Communications Officer. During these problems he was able, through close contact with the battery commander, to dispatch the airplane so that the minimum time elapsed before firing started. It is a well known fact that in the past, delays due to improper coordination of schedules and those due to the various factors governing the opening of fire at a specific time have resulted in much wasted flying time and in some cases, failure to complete the mission, owing to consumption of the airplane's fuel before the completion of the problem. During the recent practice the average delay between the time the airplane arrived over the target and firing started was approximately twenty minutes. There was no occasion for sending out a relief plane during any of the firing. It was clearly shown that the Communications Officer, in

direct personal touch with the battery or fire commander, is absolutely essential to the successful cooperation of the Air Service with coast defenses in a practice of this nature.

Two special problems arranged to demonstrate the value of the Air Service in the adjustment of fire beyond terrestrial observation were executed on March 29th and April 13th. (*Editor's Note.*—See Lieut. McGarraugh's article in the September issue.)

Due to the desire of the Air Service to render the utmost service within the limits of its facilities and if possible, to attempt some new phase of aerial fire control of benefit to these defenses, it was suggested to the Coast Artillery Commander that a problem be arranged with this end in view. As a result of this suggestion a conference was held to determine the features of the proposed problem. After considerable discussion it was decided to act upon the suggestion of the Fire Commander, First Fire Command, to conduct indirect fire, at long range, upon a target placed in a position off the Bataan coast which was invisible from any point on Corregidor Island, being concealed by the coast line. This position was to be approximately that from which Fort Mills had been bombarded by enemy vessels during previous war games. The range was approximately 25,000 yards. The range was to be calculated by the aerial observer on the basis of rate of speed of the airplane and time of flight from battery to target. Direction was to be obtained by tracking the plane from the battery with azimuth telescopes. This problem was fired from Battery Smith, Fort Mills, on March 29th after considerable preparation and practice in range finding and airplane tracking. Rate of speed was obtained by flying over a short course of known length (approximately 5,000 yards), using a bomb sight for sighting and stop watch for timing. This course was, of necessity, approximately on the same bearing as the battery-target line and had to be flown immediately before the range-finding flight, in order to include the windage of the moment. The battery-target line was then flown and timed, during which the battery took azimuth readings on radio signals from the observer. The battery personnel was able, in nearly every instance, to track the plane to a point directly over the target. The range was about 23,000 yards. The actual position of the target was withheld from both artillery and air service personnel in order to place complete dependency on their ability to designate same by the method devised. Only six rounds were available for this problem. The first shot was reported 10 yards short and 500 yards right. Adjustments were made and the sixth (last) shot fell 10 yards over and 10 yards left (a hit). This was considered remarkable in consideration of the num-

ber of shots fired. Aerial photographs were taken of each shot in support of the observer's estimations. Unfortunately these were oblique views, taken at various angles and altitudes which rendered accurate measurement of the deviations practically impossible but confirmed the results satisfactorily.

On April 13th a similar problem was conducted, using four rounds each from Battery Marshall, Fort Drum and Battery Smith, Fort Mills. The target was anchored in a similar "blind" area off the coast of Cavite, south of Corregidor. The ranges from Batteries Marshall and Smith were 16,000 and 22,000 yards respectively. The range and direction for Battery Marshall were obtained by time of flight and tracking as in the previous case. Battery Smith received the location of the target by radio signal from the observer, applied to a grid map of the area. Owing to the fact that Battery Marshall was forced to change guns after the second shot, the results of that battery's problem were not considered wholly satisfactory, the first shot being reported correct for range. Battery Smith followed immediately with four rounds.

The results obtained were satisfactory; range was correct on the second shot. Aerial photographs were taken of all shots but due to the small size of the targets, a choppy sea obliterated them and in addition, bad air conditions threw the plane about so that the camera failed to include some of the splashes within its field.

Due to the fact that the target area was invisible from the coast defenses during these special problems, a second seaplane, carrying a Coast Artillery officer as safety officer and an Air Service observer to operate the radio set, was sent out. Radio communication was maintained directly with the battery and the fire controlled thereby.

On April 6th an attempt was made to obtain an aerial photographic record of ten rounds fired from Battery Cheney, Fort Mills, on a moving target with a view to determining, by scaling the photographs and measuring the deviations, the relative accuracy of air observation and terrestrial observation. Unfortunately this problem was marred by an erratic gun which placed its shots so wide of the target that nearly all fell outside the field of the camera. Only one satisfactory view was secured. This was scaled and the battery-target line drawn from the replot chart. The results gave air observation a high percentage but were obviously not conclusive.

The communications procedure used was that prescribed with the following variations:

- (a) The International "error" signal (10 dots) was used for correcting errors instead of the "repeat" signal (UD).
- (b) The "repeat" signal (UD), the correct significance of which is "I am about to repeat", was used solely in this sense. All messages from plane to ground and vice versa were immediately repeated to avoid requests for repetition and consequent delay.
- (c) Requests for repetition were made by the standard reglage signal "39."
- (d) The use of the sending station's call letters after communication had been established was omitted as this practice was deemed unnecessary and the cause of unwarranted delay. The airplane called the fort station and signed off with its call letters. The fort station then called the airplane and signed off with its call letters. The airplane then made the acknowledgment sign and thereafter the signing off was dropped.
- (e) The "separation" signal (BT) between the body of the message and the "end of message" signal (AR) was omitted as this was considered superfluous.
- (f) The following standard and special signals were used in addition to those prescribed:

Signal	Plane to Ground	Ground to Plane
11	Can't see panels	Look at panels
23	Not in position to observe	-----
39	Repeat last message	Repeat last message
41	Wait a few minutes	Wait a few minutes
42	Wait at least 10 minutes	Wait at least 10 minutes
43	Can't hear you	Can't hear you
44	Will continue to adjust	Adjustment insufficient—continue to observe
48		No further need of you
* 52		Will commence firing in _____ minutes
* 54	Use panels	Use panels
* 58	Interference, send on _____ meters	Will send on _____ meters
RE	Ready to observe	Are you ready?

*FL	Forced landing	-----
SR	Send relief	Do you wish relief?
*YS	Yes	Yes
NO	No	No
*UD	I repeat	I repeat
BR	Ready to receive	-----
ZBP	Send faster	Send faster
ZBQ	Send slower	Send slower
ZBU	Your Morse is bad	Your Morse is bad
ZGJ	My receiver is out of order	-----
ZGY	Your note is bad	Your note is bad
ZKN	Send V's for one minute	Send V's for one minute
* Special signals.		

(g) Owing to the necessity of placing panels, in case these were required, on ground of varying nature adjacent to the batteries, the following simple system was adopted which permitted of display in a very limited space, through elimination of the identification panel. Both white and red panels were provided, the latter for use on the concrete parapets of certain batteries.

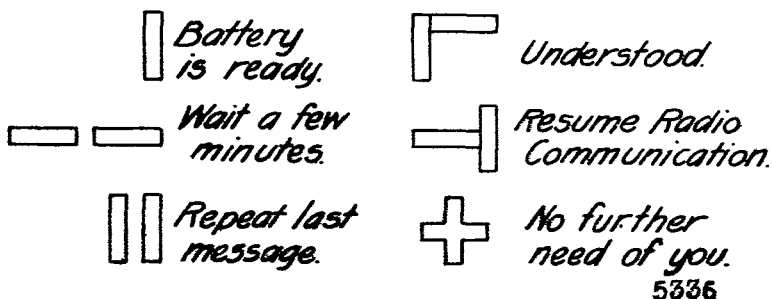


FIG. 1.

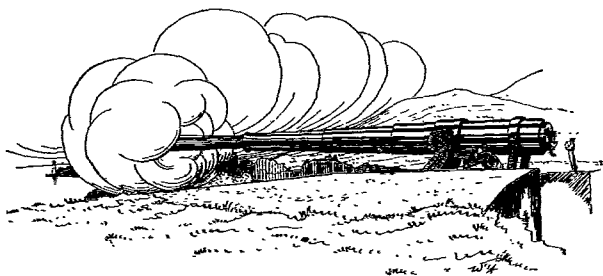
It may be stated that the air observations recorded compared favorably with the average obtained from the various methods of ground observation. It was found that the air observations ran consistently close to the plotted results of many of the problems. It is interesting to note that in many cases no ground observation report was received or such reports were delayed and the battery commander used the air observation. In two or three instances battery commanders voluntarily fired their entire problem on airplane reports. The average time required for the airplane report (from

time of splash to time of delivery of report) was twelve (12) seconds. Although no record of the time difference was kept, this was several seconds faster than terrestrial reports.

The flying equipment of four Type HS2L seaplanes performed well considering their age and characteristics. Of 25 flights totaling 42 hours and 5 minutes on actual observation missions, there was one forced landing.

The aerial observers, Captain I. H. Edwards, 1st Lieutenants W. S. Gravely, C. R. Evans and R. L. Owens deserve great credit for their conscientious and efficient work in bringing the Air Service's part in this practice to a most successful conclusion. Great credit is also due Technical Sergeant David Reeves, Air Service, for his energy and efficiency in installing and maintaining the airplane radio equipment as well as the ground station apparatus. The total absence of a failure in communications, the most vital factor in aerial observation, was due in a great measure to his efforts.


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Communications Officer,
1st Lieut. Air Service



Corregidor Miniature Range for Fixed Artillery

By First Lieutenant Bonner F. Fellers, C. A. C.

Editor's Note—A description of the Corregidor Range for Mobile Artillery appeared in the COAST ARTILLERY JOURNAL for December, 1922.

 IN order to give each battery Commander and his men a maximum amount of training in fire adjustment and artillery drill, during the indoor period (1922), the Commanding Officer called upon Lieutenant Colonel F. S. Long, C. A. C., the Coast Defense E. and R. Officer, to construct a Miniature Range. The Commanding Officer had in mind a range at which a Battery Commander could try the different methods of adjustment, using the actual dispersion of a rifle rather than arbitrarily placed smoke puffs or the "overs and shorts" as drawn from a hit bag. It was hoped that conditions at the battery would be, as nearly as possible, reproduced at the range; that all men might obtain a working knowledge of their various duties, before the outdoor period should begin. In other words it was desired to build a Coast Artillery Laboratory, where the officers and men could go and actually work out problems and difficulties which confronted them at Service Practice.

The room selected by Lieutenant Colonel Long, is the lower floor of the E. and R. Building about 40 feet by 60 feet, with a 12 foot ceiling (Figure 1). A shallow concrete tank 15 feet by 18 feet was placed in one corner of the building. The tank can be flooded and drained and has several different rails planted in the concrete on which miniature ships can be drawn from right to left. The ships, cast in brass, are pivoted forward and aft so that a hit above or below the water tips the target. Water is admitted to the tank so that the ships are water lined and apparently sail across the pool. (Figure 2).

At the other corner of the room opposite the tank, at a distance of about 50 feet, is mounted a 22 Cal. Gallery Rifle. (Figure 3). This gun is mounted on a pedestal 8 feet above the floor, is equipped with a telescopic sight, an elevating mechanism graduated in yards of range, a traversing mechanism and a lanyard for firing. The midrange for this gun is assumed to be about 10,000 yards (to a scale of approximately $1/600$). Men detailed on the gun are gun pointer and elevation setter, the former has practically the same

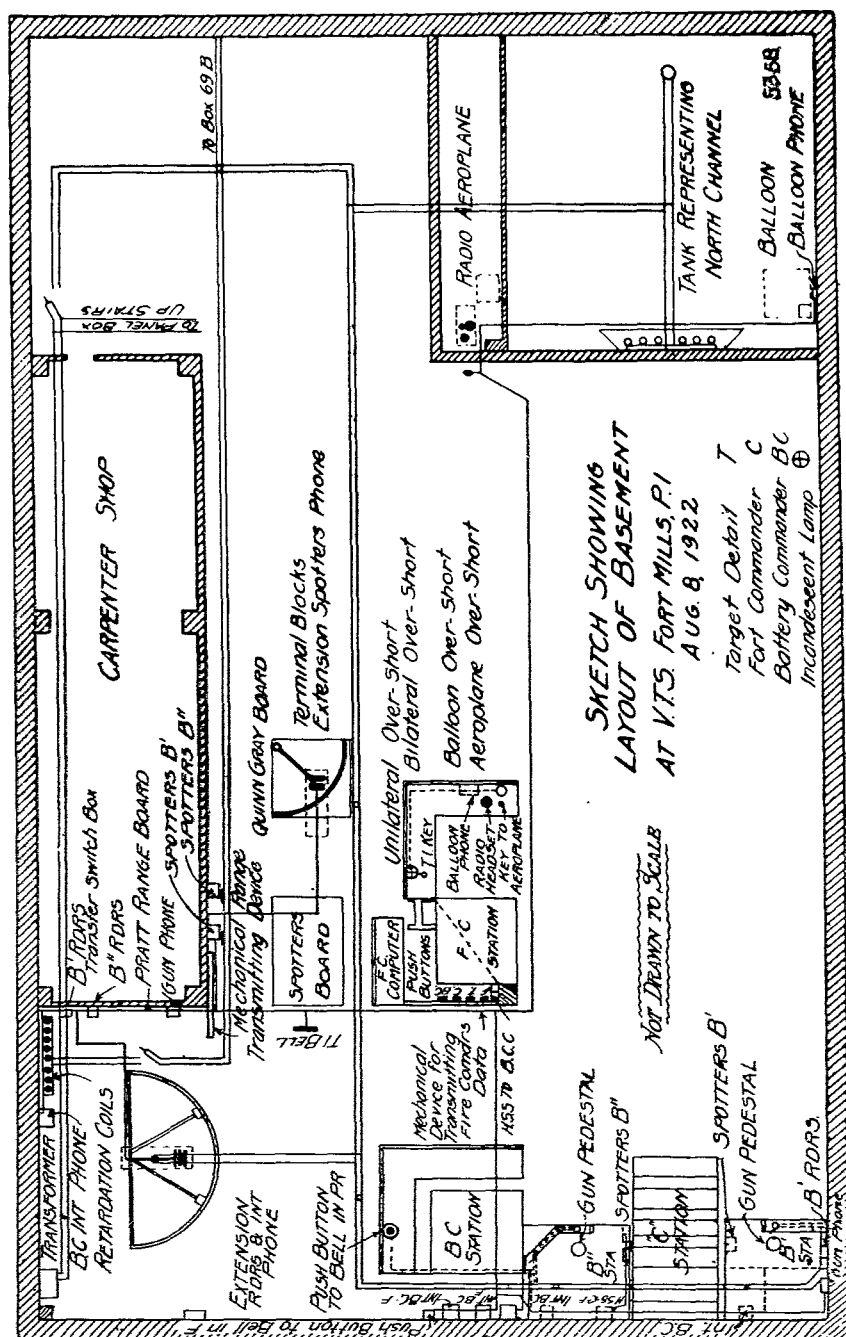


FIG. 1. LAY-OUT OF MINIATURE RANGE

duties as at target practice, while the latter actually receives and sets ranges in the same manner as if he were laying a big gun.

At right angles to the gun-target line and 9 feet from the gun an improvised D. P. F. is mounted 10 feet above the level of the pool. This D. P. F. is an old 1908 azimuth instrument (Figure 4), which has been altered by the addition of an elevating scale so that the instrument accurately reads ranges to the different targets. The duties of the observer and reader are identical to those when manning an observation station in target practice. Near the gun and D. P. F. pedestals are two azimuth instruments, mounted so as to give readings for work with the horizontal base, or emergency base end

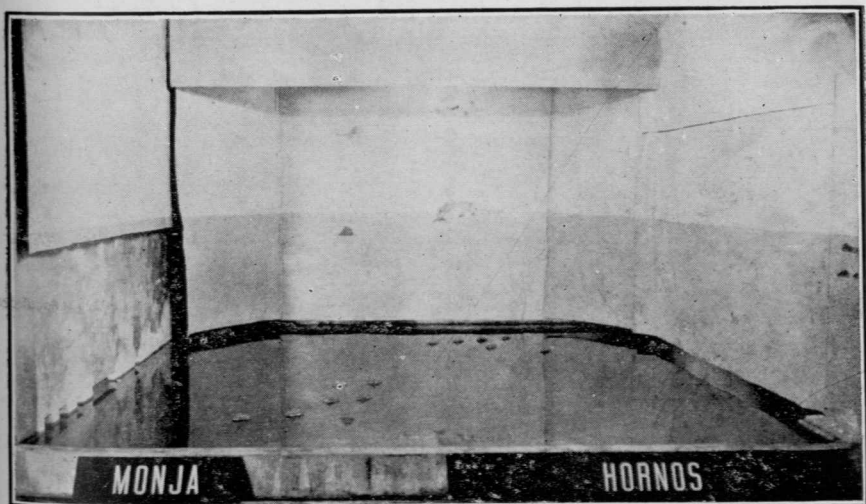


FIG. 2. VIEW OF POOL WITH SHIP MODELS

stations as may be called for by the particular problem. A plotting board is installed adjacent to the D. P. F. Here arm setters, plotters, assistant plotters, readers, recorders, in fact the entire range detail work with actual data obtained from observations. Atmospheric slide rules, barometers, deflection boards, plotting boards, range boards, and slide rules all may be used as in regular practice. Conditions are ideal for trying out all sorts of improvised apparatus and schemes.

The Battery and Fire Commanders have stations at advantageous positions where they can watch all their men at work; they can see the drill, trace the data from one point to another and determine just where the "leaks" and errors occur. Spread out in front of them is laid down the whole problem of firing a Major Caliber

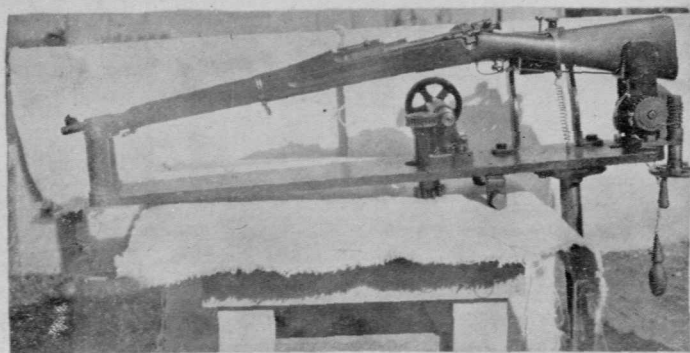
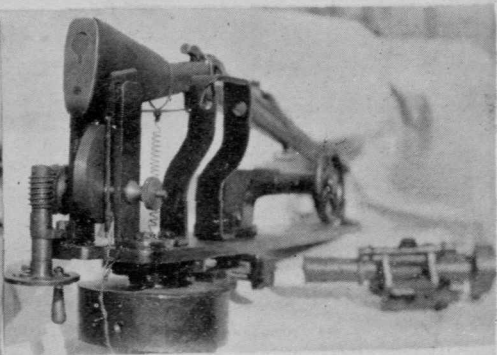
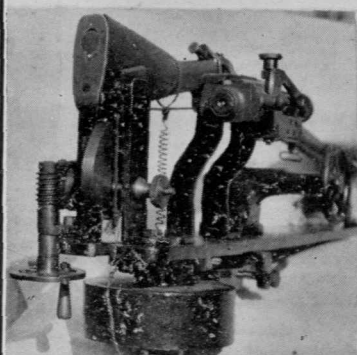
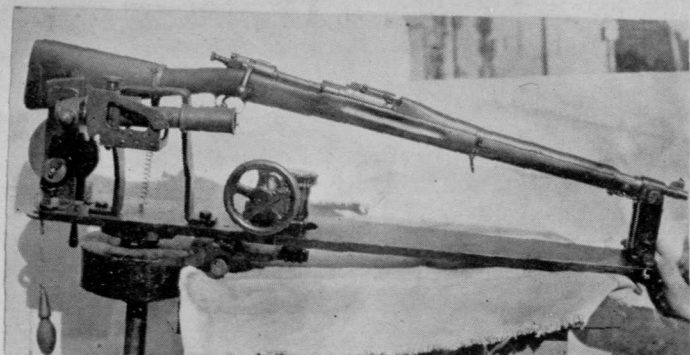


FIG. 3. MOUNTING OF THE GALLERY RIFLE

Battery. By means of holes cut in the floor above the tank, airplane and balloon observation are simulated. This observation, together with the unilateral or bilateral of the observation stations, enables the officer conducting the firing to use various classes of data for adjustment. All messages are sent by signals or telephone, a panel set gives the aerial observers their data. A complete set of F. C. telephones is provided.

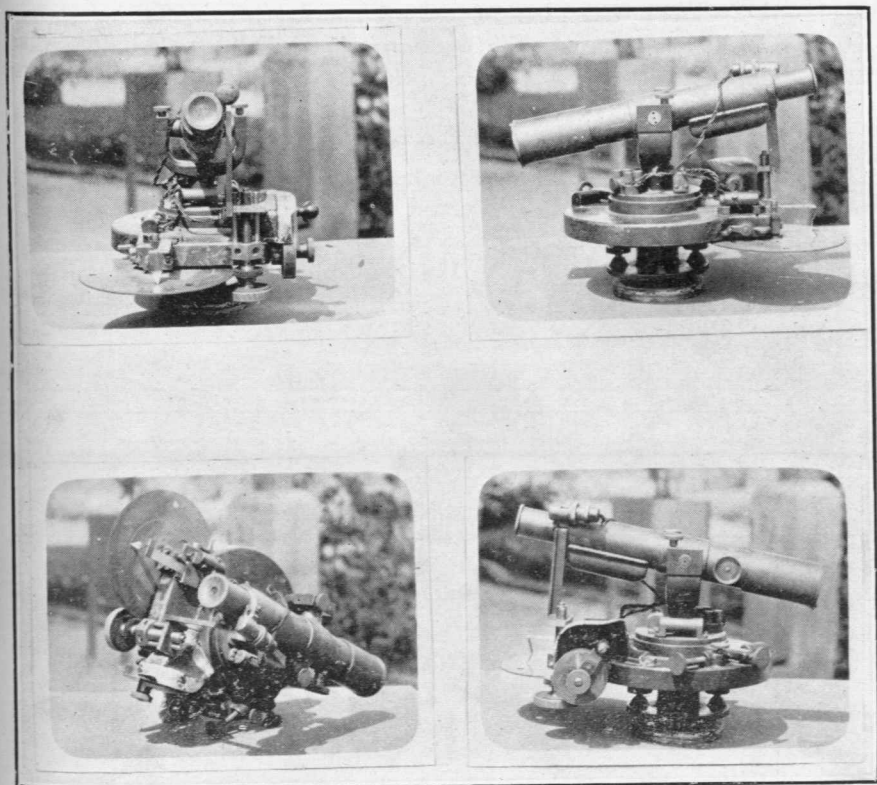


FIG. 4. 1908 AZIMUTH INSTRUMENT CONVERTED INTO D. P. F.

Along one side of the room (Figure 1) is a carpenter shop where officers and men can find tools, leather, metal and wood with which they may work out any particular piece of apparatus which would help in their work. The whole room is a neat, systematic, scientifically arranged battery and laboratory. Here the officers can fire dozens of problems in adjustment, they can see the fallacy of adjusting on data which contains errors of personnel; they can watch each man on the work he must do at the battery and most important of all, they can make bold corrections in adjustment

without fear of serious mistakes and criticism. The 22 Cal. Rifle approximates to the reduced scale the same dispersion and probable error as that of a 12-in. Gun at midrange; the problem of adjustment is worked so frequently that it becomes "second nature." (Actual practice has shown that the splash of a regular 22 Cal. Rifle bullet is too pronounced; the 22 Cal. "Flobert" cartridges give a more satisfactory splash together with more dispersion to be adjusted.

At the present time when 1600 Filipinos are being moulded into Coast Artillerymen, our miniature range is of double value. These men, new to Artillery, display exceptional interest in the range; its value has made itself evident in the present service target practice in which, with fair success, Filipino soldiers are firing major caliber guns at moving targets. Each man wants to see exactly what each piece of apparatus is for and try to operate it. Positions which offer ratings and extra-pay are special goals towards which these ambitious soldiers strive. If the Filipino fails in Coast Artillery work it will not be due to lack of interest and application.

THIS MINIATURE RANGE

IS ONE SCHEME TO AID TRAINING.


HAS YOUR SCHEME

BEEN DESCRIBED IN THE JOURNAL?

Camp Alexander Hamilton

By Major Manning M. Kimmel, 62nd Art.

PURPOSE

HE training of Antiaircraft troops (Regular, National Guard and Reserves) in the Second Corps Area was considered during the Fall of 1922 by the Commanding Officer, 2nd Coast Artillery District. Various projects were proposed for the coming training season and finally the Old Camp Upton reservation was selected as the site best adapted to the needs of the Anti-aircraft service.

The 62nd Artillery, (A.A.), being located in the 2nd Corps Area at Fort Totten, New York, was charged with the responsibility of arranging all the details for the construction of the camp and preparing the schedules of instruction for the various organizations of the Army of the United States to participate in the summer training. Neighboring Corps Areas, being without any Regular Antiaircraft troops, requested that the 62nd Artillery assist in the training of their antiaircraft units.

Consequently it was decided to include in this camp of instruction the following schedule:

ORGANIZED RESERVE OFFICERS' FIELD TRAINING CAMP

July 1 to 15, 1923

Senior Instructor	Major Clarence B. Ross, C. A. C.
Assistant Instructor	Captain Benjamin F. Harmon, 62nd Art.

Student Officers:

Captain Robert J. Wightman	2nd Lt. Raymond R. Riddle
Captain Chester W. McNally	2nd Lt. William Robertson, Jr.
1st Lt. John A. O'Leary	2nd Lt. Henry M. Evans
1st Lt. Walter H. Ogden	2nd Lt. Frederick A. Hall
1st Lt. Charles J. McCarthy	2nd Lt. Francis J. Sette
1st Lt. James McK. Rose	2nd Lt. Henry J. Kunze
1st Lt. John M. Peabody	2nd Lt. Arthur J. Morgan
1st Lt. Rowland K. Bennett	2nd Lt. Hugh H. Roden
2nd Lt. John S. Flockhart	2nd Lt. Arnon D. Thomas
2nd Lt. William B. McGee	2nd Lt. Albert J. Browning.

Reserve Officers on inactive duty as observers at Camp Alexander Hamilton:

Lieut. Col. Theodore Monell, CA-ORC	July 3rd to July 15th
Lieut. Col. E. J. Oglesby, CA-ORC	Aug. 12th to Aug. 18th
Captain Charles S. Clifford, CA-ORC	July 4th to July 11th

OFFICERS' SCHOOL FOR OFFICERS AND SELECTED ENLISTED MEN
198TH ARTILLERY (A.A.) NATIONAL GUARD DELAWARE
July 9th to 12th, 1923

Senior Instructor	Major John P. McCaskey, C. A. C.
Assistant Instructor	Captain Lewis A. Hudgins, C. A. C.

OFFICERS' SCHOOL FOR OFFICERS AND SELECTED ENLISTED MEN
197TH ARTILLERY (A.A.) NATIONAL GUARD NEW HAMPSHIRE
July 9th to 12th, 1923

Senior Instructor	Lieut. Col. Alexander Greig, C. A. C.
Assistant Instructor	Captain Ben B. Blair, C. A. C.

212TH ARTILLERY (A.A.) N. G. NEW YORK, FIELD TRAINING CAMP
July 14th to 28th, 1923

Senior Instructor	Major Robert C. Garrett, C. A. C.
Assistant Instructor	Captain John P. Kohn, C. A. C.

198TH ARTILLERY (A.A.) DELAWARE, FIELD TRAINING CAMP
August 4th to 18th, 1923

Senior Instructor	Major John P. McCaskey, C. A. C.
Assistant Instructor	Captain Lewis A. Hudgins, C. A. C.

197TH ARTILLERY (A.A.) NEW HAMPSHIRE, FIELD TRAINING CAMP
August 18th to September 2nd, 1923

Senior Instructor	Lieut. Col. Alexander Greig, C. A. C.
Assistant Instructor	Captain Ben B. Blair, C. A. C.

ORGANIZATION

Camp Headquarters was organized as follows:

Camp Commander.	Colonel Charles H. Hilton, 62nd Art.
Camp Executive	Major Manning M. Kimmell, 62nd Art.
Communications Officer	1st Lt. Goeffrey M. O'Connell, 62nd Art.
Plans and Training Officer	Captain Benjamin F. Harmon, 62nd Art.
Intelligence Officer	Captain Benjamin F. Harmon, 62nd Art.
Camp Adjutant	Captain Charles E. Atkinson, 62nd Art.
Surgeon	Major George S. Woodard, M. C.

Assistant Surgeon	Major Irwin B. March, M. C.
Munitions Officer	2nd Lieut. Otto M. Jank, 62nd Art.
Quartermaster—	
(Supply and Messing)	1st Lieut. John T. Dollard, Q. M. C.
Assistant Quartermaster	1st Lt. John T. McKay, Q. M. C.
Recreation Officer	Captain William M. Cravens, 62nd Art.
Athletic Officer	1st Lt. Edward W. Timberlake, 62nd Art.
Camp Exchange Officer	1st Lt. John T. Dollard, Q. M. C.
Chaplain and	
Publicity Officer	Chaplain Thomas E. Swan, U. S. A.

SELECTION OF NAME FOR CAMP

Alexander Hamilton, one of America's greatest patriots, and a man whose name is familiar to every school boy and girl in the nation, among his many other services to his country, organized a battery of artillery to fight in the Revolution. This battery, whose existence has been continuous since the date of its organization, now Battery B, 62nd Artillery, is the oldest unit in the United States Army. With the thought that the name and all that it symbolizes in the hearts of the American patriots might prove to be an inspiration to all officers and men attending, it was decided to designate this camp as "Camp Alexander Hamilton."

PREPARATION OF THE CAMP

Camp Alexander Hamilton was located about three miles from Manorville, Long Island, New York, on the Camp Upton reservation at 1st Avenue and 16th Street.

All buildings pertaining to the old Camp Upton reservation had been demolished and sold at auction, consequently no cantonment buildings or any other facilities were available for use.

It was necessary to place the entire camp under canvas with the exception of the Recreation and Assembly building, which was constructed especially for this camp. Also it was necessary to sink two wells to a depth of 60 feet and erect two water tanks for the supply of water, and to install a gasoline operated electric generating set for street lighting, operation of moving pictures, and lights in officers' tents. The water supply was found to be adequate and of excellent quality. The ground upon which the camp was situated was covered with a thick growth of scrub oak and other underbrush difficult to remove. The soil however was sandy and porous, immediately absorbing all surface water.

Harmless varieties of mosquitoes were quite numerous, necessi-

tating the use of mosquito bars each night. Successful precaution was taken to prevent the breeding of flies in and around camp.

All latrines were of the box type, provided with removable cans. These cans were hauled away from camp a distance of about a mile and the contents dumped into pits dug for this purpose. Each latrine was also provided with a separate urinal can with cover.

All tents were floored with lumber purchased from funds provided for the preparation of the camp site.

The Machine Gun Battalion of the 62nd Artillery was ordered to Camp Upton reservation in the early part of June to start work on the camp site. Underbrush was cleared away and the tents for the 62nd Artillery pitched. Eight rows of tents were provided for the eight organizations of the regiment. Enlisted men were quartered in pyramidal tents; battery officers in wall tents.

Three lines of storage and wall tents were provided for the Regimental Commander, distinguished visitor, and the Camp and Regimental Staff. On June 19, 1923 the remainder of the regiment with all artillery matériel including 4 Christie guns, 8 3-inch trailer mounts with guns, 6 searchlights and all other motor transportation assigned to the regiment arrived in camp. Thereafter the work of establishing the camp progressed very rapidly. The entire tentage for one complete regiment at war strength to quarter the three different National Guard regiments was erected and everything prepared for their reception, even to the cooking of a hot meal which was served upon the arrival of each organization.

MESSING

Four kitchens were constructed for the organizations of the 62nd Artillery and three for the National Guard regiments. Kitchens were constructed of 2" by 4" frame structures, completely screened and covered with a paulin. One field range was placed in each kitchen. Ice boxes were dug in the ground and provided with suitable covers. Garbage was disposed of in incinerators of the Straub type. Paulins and tent flies were used to provide shelter for mess tables for the men.

Two officers' messes were constructed, one for the 62nd Artillery and reserve officers and one for the National Guard regiment in camp.

Two field bakery units which supplied fresh baked bread to all organizations were set up and operated by quartermaster personnel assigned to the camp for this purpose.



RECREATIONAL FEATURES

A recreation building was constructed for this camp which had a seating capacity of about 800. Moving pictures were shown daily except Wednesday, this day being reserved for other special entertainments.

An officers' dance was given by the officers of the 62nd Artillery in honor of the officers of the 212th Artillery (A.A.) National Guard New York shortly after their arrival in camp, and a return dance before their departure was given by the 212th Artillery to the 62nd Artillery. Both events were largely attended by the wives and sweethearts of both regiments and also by a number of specially invited guests residing in the vicinity.

Another very enjoyable event was the officers' dance given by the officers of the 62nd Artillery in honor of Governor W. B. Denny and staff of the state of Delaware, United States Senator L. Heisler Ball and Mr. George Le Bontellier, vice-president of the Long Island Railroad, during the stay in camp of the 198th Artillery from Delaware.

Enlisted men's dances were held on several occasions and were enjoyed by all concerned.

There were several evenings devoted to boxing matches between members of the 62nd Artillery and the visiting National Guard Units. These matches proved to be very successful both from the standpoint of exhibitions of clean sportsmanship and the keen interest displayed by all the military personnel.

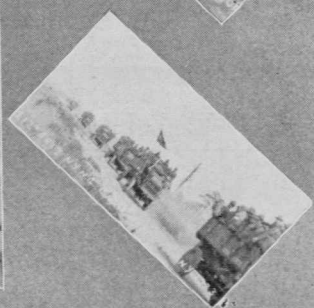
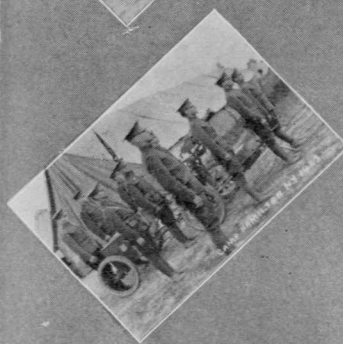
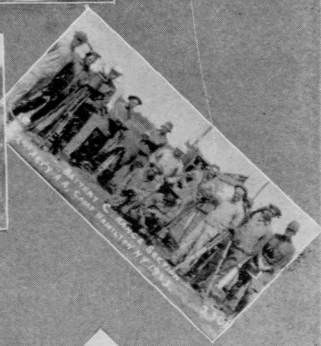
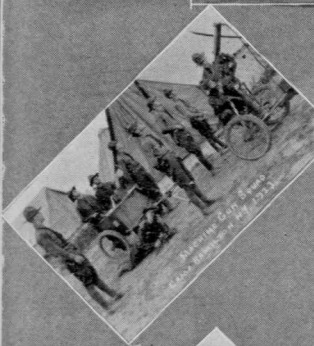
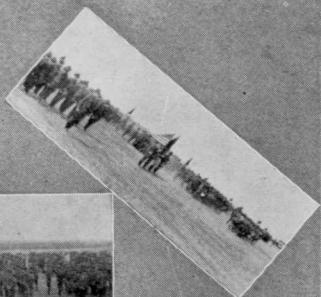
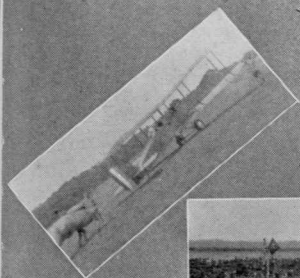
INSTRUCTION

The facilities provided at Camp Hamilton for the instruction on all the different types of matériel manned and operated by an Antiaircraft regiment left little to be desired.

The machine gun range was located about four miles from camp. It was provided with butts for firing at all ranges used in Antiaircraft and terrestrial machine gun firing. An arc of about 50° was available for aerial firing.

The firing point for the 3-inch gun target practice was H. W. Lanier's farm on the North Shore of Moriches Bay. One of the altimeter base end stations was established on Hampton Beach, the long narrow island which forms the south boundary of the bay. The other was located as usual at the gun battery position. A safety station was located on Fire Island from which a Safety Officer could observe the water out to the extreme range of the guns.

Both of the firing ranges provided excellent facilities for the



practical instruction of officers and enlisted men in firing both machine gun and 3-inch gun problems. Instruction on these ranges was made progressive for all units attending the camp. Three-inch gun firing took place in each case in the following order: wind problem, trial shot problem, firing at bursts, firing at free balloons.

An excellent airplane landing field was available within a few yards of the guns. This was utilized by the Air Service before each practice involving the use of airplanes. Excellent cooperation between the Air Service and the Artillery was experienced.

A demonstration firing at towed targets was given by the 62nd Artillery for the benefit of the Reserve Officers and each National Guard regiment. The most successful of these demonstrations took place on Friday, the 13th, when from 48 rounds, 26 shrapnel holes were obtained in a sleeve target twelve feet long and two and a half feet in diameter, while it was being towed at the rate of 85 miles an hour by Lieut. James T. Curry, Jr., Air Service, at an altitude of 6000 feet and at a horizontal range of 4000 yards. This was the regular practice of Battery C, 62nd Artillery, commanded by Lieut. Edward W. Timberlake, C. A. C. During the firing on the morning of this date 35 rounds were fired without hits on the matériel target, although observation showed the bursts to be all around and so close that a hostile plane under such circumstances would have been hit repeatedly by explosive shell.

INSTRUCTION OF RESERVE OFFICERS

The schedule of instruction for the Reserve Officers' Camp was prepared by the Plans and Training Officer of the 62nd Artillery after several conferences with the Commanding General and Staff of the 2nd Coast Artillery District. Every phase was carefully planned and thought out months in advance. This was found to be a very wise and practical course as very few changes in the schedule were found to be necessary or desirable.

In general the schedule covered the following subjects:

- Organization of Antiaircraft (Lecture)

- Matériel, both machine guns, 3-inch gun, searchlight, nomenclature, care and functioning (Practical handling and Lectures)

- Firing problems (Actually conducted by reserve officers)

- Regimental Communications (Lecture and practical demonstration)

- Emplacements (Lecture and practical demonstration)

Convoys (Lecture and practical demonstration)

Gunnery (Lecture and solution of problem)

Tactics (Lectures and solution of two type problems by reserve officers)

Identification of Aircraft (Lecture)

Equitation and Horsemanship (Elementary instruction only was given. Each officer had an opportunity to ride at least once during the period of the camp)

Ceremonies (Conducted by Reserve Officers in command of Regular troops).

All officers and specially qualified non-commissioned officers of the 62nd Artillery were made available to impart this instruction to the Reserve Officers. During the camp all student officers received the same course of instruction but each was attached to a battery in accordance with his assignment in the Organized Reserves for additional detailed instruction. This was largely informal and carried out by talks with officers and non-commissioned officers, nevertheless, it was a very valuable part of the training. Instruction in guard duty was given by having the reserve officers replace the regular officers on the guard roster, Captains and First Lieutenants mounting guard as Officer of the Day and Second Lieutenants as Officer of the Guard. However, this instruction was not allowed to interfere in any way with that on the regular schedule of training.

INSTRUCTION OF OFFICERS AND SELECTED ENLISTED MEN FOR FOUR DAYS

On July 9th detachments of 25 officers and 50 enlisted men, 197th Artillery and 28 officers and 53 enlisted men, 198th Artillery, arrived in camp for a special four days' school of instruction. The whole idea of this special school was to qualify officers and selected enlisted men as instructors in Antiaircraft subjects prior to the regular fifteen days' camp of instruction and field training. It was necessary however to make this instruction fit in with the schedule in force at this time for the reserve officers. This was done with excellent results.

Gun crews, fire control sections, searchlight squads, machine gun squads, combat, staff and headquarters sections were formed from the personnel of the appropriate National Guard organizations and practical instruction given in the actual drill and operation of all corresponding matériel.

This instruction culminated in actual target practice firing.

INSTRUCTION OF 212TH NEW YORK AND 198TH DELAWARE

The schedule of instruction for each of these organizations was prepared by the Regular Army instructor detailed for duty with these National Guard units.

Several conferences were held during their preparation between the Commanding General, 2nd Coast Artillery District and Staff and the Commanding Officer, 62nd Artillery and Staff and the instructor concerned. These conferences resulted in a very practical and comprehensive schedule in each case.

These training schedules were drawn up in graphic form showing each day of the two weeks by periods and the nature of the instruction to be given each section during this period. Five charts were made as follows:

- Chart No. 1 Giving the general outline
- Chart No. 2 Headquarters Battery
- Chart No. 3 Service Battery
- Chart No. 4 Gun Battalion
- Chart No. 5 Machine Gun Battalion

The general scheme of instruction followed was to assign each officer or enlisted man of the National Guard under the corresponding officer or enlisted man of the 62nd Artillery, who in each case acted as instructor and advisor. As far as practicable each operation was demonstrated by units from the 62nd Artillery. This was followed by a drill conducted entirely by National Guard personnel.

This method of instruction was found to be very satisfactory in all respects.

Besides the instruction given each section or squad in its normal duties instruction was given to include the following:

- Identification of Aircraft
- First Aid
- Guard Duty (National Guard mounted guard daily in their own camp, their guard being entirely separate from the regular camp guard)
- Revolver Marksmanship
- Personal Hygiene
- Military Courtesy
- Automatic Rifle
- Infantry Drill
- Ceremonies
- Convoy
- Making Shelter Tent Camp

Occupation of Positions

Tactics (Problems solved by officers).

The officers and enlisted men of both of the above mentioned organizations displayed the keenest interest in the instruction being given. Consequently a most profitable and enjoyable period of training was experienced by both units. A considerable advance has been made in preparing these National Guard troops for the duties that it will be necessary for them to perform in time of war.

Owing to sudden and unexpected arrangements the 197th Artillery, National Guard New Hampshire, did not come to Camp Hamilton for training. The time allotted to them was utilized for the Annual Tactical Inspections of the 62nd Artillery.

RESULTS OBTAINED

Friendship, mutual understanding, practical instruction and theoretical grounding have been the net results obtained at Camp Alexander Hamilton with the Reserve Officers, and National Guard officers and men.

The good feeling which existed at all times between the 62nd Artillery personnel and the visiting personnel was very noticeable. New friendships were formed and old ones cemented into a bond that will be everlasting.

There was only one Army at Camp Alexander Hamilton and that the Army of the United States.

"WE NOMINATE FOR THE HALL OF FAME—"

THE 62ND ARTILLERY (A. A.)

A "GO-GETTER OUTFIT"

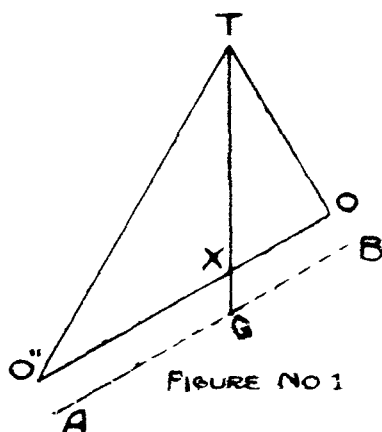
The Bowler Spotting Board

By Captain Louis J. Bowler, C. A. C.



THE spotting board described herein has been used at service practices by various batteries in the Coast Defenses of Puget Sound since 1921. It has functioned satisfactorily. It is simple, rugged, requires but two operators, and the accuracy of the data obtained is well within the requirements for a spotting device. It can be used in adjustment of fire upon the set-forward point and is a satisfactory substitute for a difference chart in relocating work.

The writer lays no claim to originality for the principles involved in the board. It is purely a combination of already existing and well known devices.



Referring to Figure 1 let:

T = Target

G = Gun

O' = Primary observer

O'' = Secondary observer

O'O' = Baseline

AB = A line parallel and equal to the base line and passing through the gun position

X = The intersection of the base line and the line gun-target when the target is due north of the gun.

It will be seen readily that if this entire figure be rotated about G as a center, the relative position of points and lines will remain unaffected. Angles $TO''X$ and $TO'X$ will retain their values, line AB will continue parallel and equal to line $O''O'$, and the length of GX will be constant.

Let it be assumed that a gun is so emplaced that it can fire in the direction of North only. Obviously it can deliver fire only upon such targets as lie along azimuth 180.00.

When the target does not lie in such an azimuth, let it be assumed that a section of the earth embracing target, gun and observing stations, may be rotated about the pintle center of the gun so as to place the target between the gun and the North Pole. This action may be effectively represented by the rotation of representative lines on a specially prepared device that permits distances to be measured and angles determined in value. The board hereinafter described is constructed so as to operate in conformity with the foregoing principles.

A. CONSTRUCTION OF THE BOARD

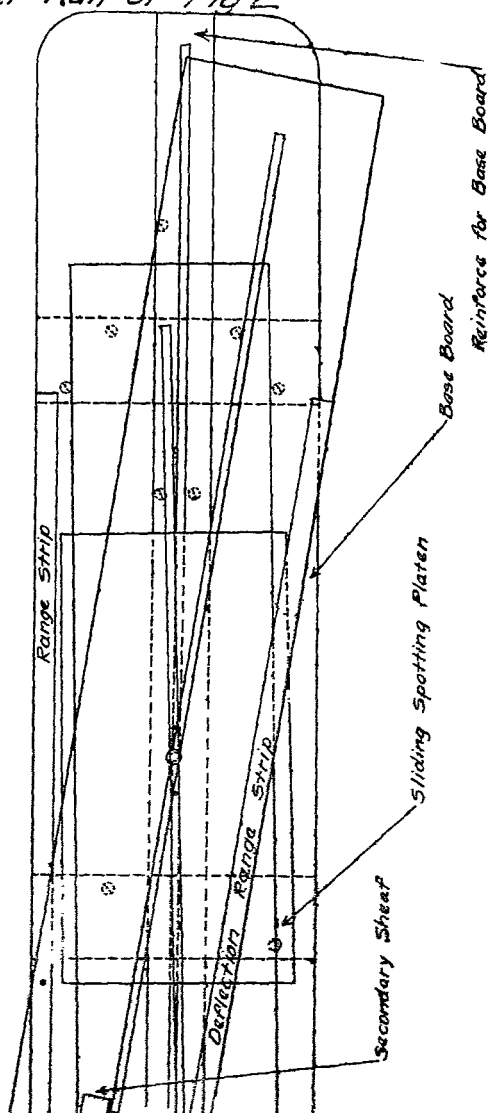
For all purposes other than actually determining the values of deviations, the scale of the board is one inch=300 yards.

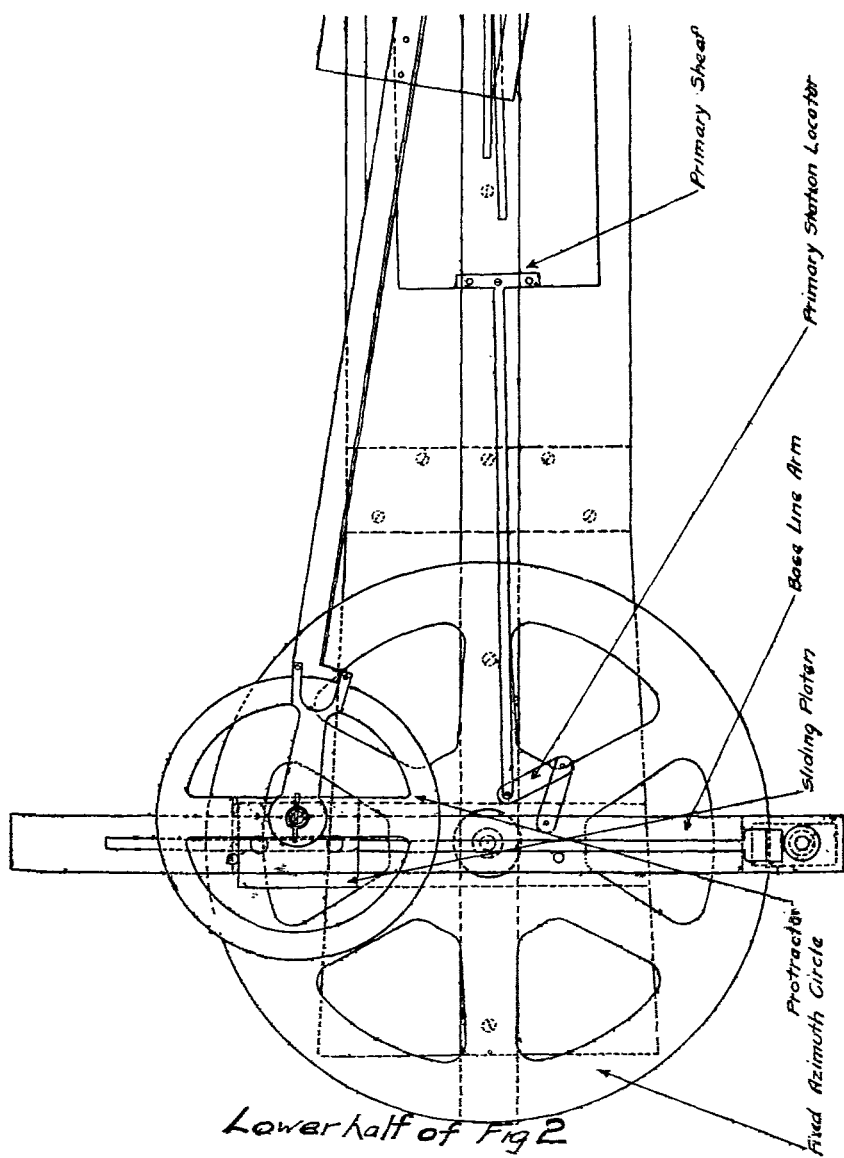
The dimensions of the board are more or less dependent upon the armament to be served, the positions of the spotting stations, and the material available for use. It may be stated here that with the exception of the xylonite required, the scrap heap of the average ordnance machine shop will yield all the necessary material. At the same time the ability of an ordnance machinist will be requisite to accomplish the complete construction of the board.

Along the center of a cleated board a metal strip is sunk flush with the board and milled out to a sufficient depth to receive the lug that guides the spotting platen. At the proper end of the board an azimuth circle graduated counter-clockwise is fixed so that its readings will be convenient for using the baselines likely to be employed under service conditions. The center of this circle is the gun position. Pivoted at the gun position is the baseline arm.

The baseline arm is slotted down the center nearly its entire length so that the center line of the slot passes over the gun position and includes the index of the baseline arm vernier. Along the baseline arm and guided by lugs that fit in its slot moves the protractor platen, alluded to in Figure 2 as the sliding platen. To this platen is clamped the protractor which is provided with a metal arm bearing a vernier. In order to tap in the opening at the proper place for the protractor clamp screw, it is simply necessary to set the

Upper half of Fig 2





baseline arm at the azimuth of the baseline to be used, place the center of the platen over the gun position and measure off according to the representative fraction the distance North (or South) from the gun to the baseline. The protractor arm remains free to move about the center bearing of the protractor.

By referring to Figure 1, it will be seen that the protractor platen lugs move along line AB and carry the center of the protractor along the line O'O'. This permits the protractor to be used for reading azimuths at any point along the baseline arm. By the use of stops in the baseline arm the movement of the protractor may be regulated to accommodate any length of baseline.

The protractor arm terminates in a sheet of xylonite one sixteenth of an inch in thickness. Upon this sheet is etched a truncated sheaf of rays $.30^\circ$ apart and centered at the center of the protractor. A similar sheet constitutes the nether portion of the primary arm, the rays converging at the pivot of this arm which is located at the proper point on the board by means of the primary (or spotting station nearest the gun) station locator.

For purposes of explanation, let it be assumed that one is standing at the azimuth circle end of the board. The left edge of the groove in the sunken strip of metal prolonged passes through the gun position and is always a North and South line. The left edge then, of the slots cut in each xylonite sheet on the right of their center line becomes the fiducial edge for each sheaf of rays.

The spotting platen is made of thin sheet metal. It is approximately eight inches wide and sixteen inches long. By means of a fixed lug it is made to slide longitudinally along the metal strip, the lug fitting the groove in the strip. At the center of this platen is the set-forward peg surmounted by a small knob. This peg fits smoothly in the slots of both xylonite sheets. On the platen are a center line (North and South) and lines perpendicular to the center line one inch apart. These latter lines are representatively one hundred yards apart. When the rays which are actually $.30^\circ$ are read as $.10^\circ$, for spotting purposes this portion of the board becomes exaggerated three times greater than the remainder. On the left side of the platen is a pointer in order that the set-forward peg may be set in range according to the scale of the board.

A range scale with its zero opposite the gun position is pasted along the left side of the board and under the platen pointer. On the right side of the secondary sheaf with its zero opposite the center of the protractor is a second range scale. Both the foregoing scales are 300 yards to the inch.

B. OPERATION OF THE BOARD

(Assume target at 180.00°)

To orient the board for a particular baseline for which the baseline arm stops have been set and protractor platen prepared.

Set the baseline arm at the azimuth of the baseline to be used. This is accomplished by subtracting the true azimuth of the baseline from 270° and setting the arm at the result obtained.

Place the center of the platen over the gun position. A mark on the arm will facilitate speed and accuracy in this operation. The center of the protractor is now North of the gun (or South) and on the line of the left edge of the grooved metal strip which passes through the gun.

Unclamp the protractor and rotate it until it reads 180° . Clamp the protractor. Since its center is due North of the gun and since the gun can fire North only, a target in the line of fire must have the same azimuth from the center of the protractor as from the gun. The board is now oriented. By sliding the platen (protractor) to the primary spotting stop, it will give the azimuth to any point in the North and South line through the gun from the primary spotter's station. If the battery commander's station be at or near the primary spotter's station, it will provide such commander with the azimuth of the same points from his station. Thus the board will serve the purpose of a difference device.

The board has now been oriented upon an assumed target due North and at any number of assumed ranges. In order to make the board practically operable, four men are required, an operator, a spotter and two observers. Each observer is provided with a 1910 model azimuth instrument, and both are provided with headsets that permit communication with the board operator, in the plotting room of the battery.

The operator sits conveniently near the baseline arm and the spotter near the spotting platen. As ranges and azimuths are called out by the plotting detail, the spotter keeps his platen set at the range to the last set-forward point and records the azimuth of each set-forward point as it is called out. The operator, if the board is used as a difference device, sets the baseline arm at the azimuth of the predicted points as they are called out, and with the protractor platen set at the primary spotting stop reads to the battery commander's station the correct azimuth from that station to the predicted points. When the piece is fired the spotter places quickly before the operator the azimuth of the set-forward point on which the piece was fired. The operator sets the baseline arm at this azi-

imuth, reads to the primary observer the azimuth of the set-forward point from the primary spotting station, then moves the protractor platen to the secondary spotting station stop and reads to the secondary observer the azimuth of the same point from his station.

The azimuth readings above mentioned are, of course, taken from the protractor which can be read to within five hundredths. These readings are thoroughly faithful in like manner as if taken from any one of the standard plotting boards because the rotation of the baseline arm compensates for the angular displacement of the target from true North.

The two spotting observers with their oriented azimuth instruments set the instruments at the azimuth transmitted to them by the operator. Their lines of sight intersect at the set-forward point. At the instant of splash they transmit to the operator, who repeats to the spotter, the amount of deflection in hundredths of a degree. By the proper intersection of lines of the two sheaves the spotter is able instantly to call out the sense and value of the longitudinal deviation. Using a pair of dividers he is able also to determine the lateral deviation at the actual range of the splash, which range he obtains with a sufficient degree of accuracy by keeping in mind the longitudinal deviation with the proper algebraic sign and glancing at the range scale on the left side of the board. By presenting the opening in the dividers to the rays on the secondary sheaf at the splash range as shown by the range scale on that sheaf sheet he is in a position to call out the deflection in hundredths of degrees. The entire operation of determining both lateral and longitudinal sense and values should not require more than ten seconds after the primary and secondary spotting details have reported their deflections.


For use of the board in gun fire, manipulation becomes much simplified. Orientation requires the same steps, but in operation the protractor platen remains at the secondary stop and deflections are referred directly to the target.

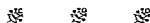
Since the board partakes of the nature of a plotting board, it is possible to plot the successive ranges of a target and by pencil records determine angular travel during the observing interval. The operation consists simply in setting the baseline arm at the azimuth of the target from the primary station and moving the spotting platen until the protractor at the secondary station stop reads the azimuth of the target from the secondary station. The range may then be read directly by the pointer on the spotting platen.



EDITORIAL

The Pencil Changes Hands

ITH this issue the editorship of the JOURNAL changes hands. Major Frank S. Clark, who has so ably guided its destinies these past four years, has been assigned to other duties. During these four years Major Clark has, by his personality, ability, enthusiasm, originality of thought, and business methods, maintained the JOURNAL at such a high standard that today no Coast Artilleryman can afford to be without it. The subscription list indicates that all but a very few regular officers of the Coast Artillery Corps and many officers of the National Guard and Organized Reserves appreciate its worth. Major Clark has succeeded in maintaining a JOURNAL that has been both readable and instructive. His own fertile pen has materially aided in this. It is believed that every reader of the JOURNAL regrets to see Major Clark relinquish the helm, and that all wish him the best of luck in all that lies ahead.



We Resume Commercial Advertising

As probably known to most of its readers, the COAST ARTILLERY JOURNAL has had to be withdrawn from the Printing Plant of the Coast Artillery School. So this issue of the JOURNAL comes from a commercial press. The net result is that the monthly cost of production is increased by several hundred dollars. This to a limited extent is offset by the moneys that may now be received from advertisements. Readers of the JOURNAL can aid it financially by mentioning the JOURNAL when dealing with firms whose advertisements appear therein.

COAST ARTILLERY BOARD NOTES

"Communications relating to the development or improvement in methods or materiel for the Coast Artillery will be welcome from any member of the Corps or of the service at large. These communications, with models or drawings of devices proposed may be sent direct to the Coast Artillery Board, Fort Monroe, Virginia, and will receive careful consideration."—

JOURNAL OF U. S. ARTILLERY June, 1922.

Work of the Board for the Month of August, 1923

A. NEW PROJECTS INITIATED DURING THE MONTH OF AUGUST, 1923

1. **Project No. 151, Subcaliber Gun for 155 mm. G. P. F.**—The Board is in receipt of blueprints and photographs, submitted by the Commanding Officer, 51st Artillery, showing the 37-mm gun mounted upon a 155-mm G. P. F. for use as a subcaliber gun. Protection is provided for the gun pointer by means of a screen of sheet iron secured to the side of the cradle by two braces. Several hundred shots have been fired with this gun with satisfactory results.

2. **Project No. 152, Range Correction Devices.**—Under this project the Board is conducting a study of range correction devices' with a view to the redesign and development of the range correction board.

3. **Project No. 153, Time Interval Apparatus for Mobile Artillery.**—A copy of the Proceedings of a Board of Officers convened to consider a Time Interval System devised by Technical Sergeant John Brewer and Staff Sergeant Samuel F. Rumford, has been received. The Chief of Coast Artillery has directed the Board to submit a report on this time interval apparatus.

4. **Project No. 154, Review of "Observation Aviation in Cooperation with Coast Artillery,"** prepared under the direction of the Chief of Air Service.—This pamphlet is being studied by the Board.

5. **Project No. 155, Test of six fuse setter mountings.**—Six modified fuse setter mountings will be shipped from Frankford Arsenal to the Board for test. Test will be conducted on arrival of this material.

6. **Project No. 156, Review of Range Tables, 8-inch Howitzer, Mark VI, Model 1917.**—These charts are being studied by the Board.

7. **Project No. 157, Review of Range Tables for 8-inch Seacoast Gun, Model 1888, Mark I.**—These tables have been sent to the Commanding Officer, Fort Eustis, Va., for his remarks and recommendations.

8. **Project No. 158, Mine Defense of Pacific Entrance to Panama Canal.**—The Board has been directed by the Chief of Coast Artillery to make a study of the problem of mine defense for the Pacific entrance to the Panama Canal.

B. PROJECTS PREVIOUSLY SUBMITTED ON WHICH WORK HAS BEEN ACCOMPLISHED

1. Projects Nos. 8 and 9, Review of the Report of a Board of Officers appointed by Special Order No. 3, Headquarters Panama Coast Artillery District, November 4, 1922, for the test of the Ford Target Computer and Ford Battery Computer.—This report covered tests of the following instruments: Ford Target Computer, Ford Battery Computer, Ford Range and Azimuth Computer, Coincidence Target Computer, and Wilson Target Computer.

The Proceedings of the Board on this Project, as submitted to the Chief of Coast Artillery, were as follows:

Conclusions:

1. The tests were conducted to determine the value of the instruments as they existed and the changes that might be needed in them to meet the requirements of an experimental fire control system as described in report of May 23, 1923, submitted for Major Quinn Gray, C. A. C., by the Commanding Officer, Panama Coast Artillery District. The Ford Target Computer and Ford Battery Computer are designed especially for use with this or a similar system which contemplates a central directing point for which target data is computed by the Ford Target Computer, with a Ford Battery Computer at each battery for relocating and applying corrections for firing. The value of these instruments as at present designed, even though otherwise satisfactory, is dependent on the acceptance of such a system of fire control in the Coast Artillery service.

This system provides for the concentration of the fire of all batteries served by a single Ford Target Computer on a single target, all of them being dependent on uninterrupted communication with the central station, and makes no provision for assignment of batteries to different targets. Such concentration of fire doubtless occasionally will be desirable, particularly at extreme ranges. At moderate ranges and at the ranges within which, in the great majority of our harbors, hostile vessels must approach and remain for a considerable period in order to accomplish any mission seriously *damaging* to the defense, a single high powered battery, efficiently served, frequently will be a suitable assignment to a single enemy target. Any fire control installation which does not permit the assignment of individual targets would seriously handicap the defense. A battery commander having lost touch with his fire commander and the central station would be reduced to emergency means for attacking targets, which every consideration would indicate as important and proper ones for his attention.

To supply to each central station as many target computers as there are batteries to serve, with one or more in reserve to provide for breakdowns would be unreasonably expensive, and otherwise objectionable. The logical alternative would suggest itself—that is, a target computer at each battery, thus eliminating one line of continuous communication and avoiding the time and mechanism for relocation. Therefore, the consolidation of the Ford Target Computer and Ford Battery Computer into a single instrument which would perform the operations (except relocation) which both at present are designed for, would be desirable. The importance of making a battery of high powered guns or mortars as self-contained as practicable, and so far as possible, independent of lines of communication from any particular point is accepted as sound doctrine by the Coast Artillery Board.

The idea that the *maximum flexibility* in the use of observing stations is necessary is concurred in as is also the principle that apparatus for determining firing data must be capable of shifting targets and base lines promptly. (Atten-

tion is invited to reports on Coast Artillery Board Projects Nos. 74 and 111.) The pooling of observing stations or the control of all observing stations by, and the training of fire control personnel under the direction of fire or higher commanders is a possible expedient with any system but has certain objections, among which are:

(a) Removal of responsibility from the battery commander for the selection and careful training of observers. He, feeling that his reputation and standing in the service depend largely on the efficient operation of his battery as a whole, will take greater pains ordinarily to insure satisfactory observation than would any one else.

(b) Lack of company *esprit* on the part of the observers and sincere desire for the success of their own organization. This interest on the part of the selected personnel of an organization contributes more to efficient service and good team work than frequently is recognized.

Two observing stations per battery are not sufficient even if facilities for interchange of base lines between batteries is satisfactory. It is entirely practicable to construct for each battery a number of emergency observing stations without expense, except for azimuth instruments and means of communication direct with the battery so that under no probable condition need a battery be without a pair of stations for range finding. This has been done to a limited extent in the Coast Defenses of Puget Sound and Los Angeles.

2. Aside from their expense and lack of adaptability for the present standard fire control system which permits assignments of batteries to separate targets, the Ford Target Computer and Ford Battery Computer in their present form appear from the tests unsatisfactory for use in the Coast Artillery service for the following reasons:

- a. They are complicated and frequently get out of working order.
- b. They require very expert operators who should be trained for several months.
- c. A trained mechanic is required for even minor repairs.
- d. They operate solely by electric power.
- e. Too much time is required for changing target and base line and these operations require special skill.
- f. The azimuth dials are hard to read, resulting in frequent errors.
- g. The range counters are likely to break through ordinary wear.
- h. They are too restricted in their field of tracking, i. e., there is too much dead space.

i. They are noisy, making telephone conversation difficult in their vicinity. The Ford Target Computer uses two scales to cover all ranges and requires too much time for the change from one scale to another. The tests indicate that this instrument, operated by and under the supervision of the Ford Company's engineer frequently failed and, when in working order, gave results but little if any better, either in accuracy or time of operation than might be expected from a properly designed manual plotting board at ranges which permit a scale of 300 yards to the inch, if the board be carefully adjusted and skillfully operated.

3. The Ford Range and Azimuth Computer, while a simpler instrument than the other two Ford Instruments is open to some of the same objections, viz:

- a. It is operated by electric power and cannot be operated by hand.
- b. It is too restricted in allowable distance from base end stations to directing point and in range to target.

c. This instrument, however, appears to offer a better basis for future development than the other two Ford instruments.

4. The Coincidence Target Computer appears to be free from some of the objectionable features of the other instruments and to give more accurate solutions of the range triangle, but is objectionably slow. This instrument in its present form, considering cost and its performance during these tests is not a satisfactory substitute for the plotting board but suggests a promising basis for future development.

5. Since there were no tests of the Wilson Target Computer, no conclusions can be reached regarding it.

6. The Board is impressed with the possible value of continuous automatic transmission of base end azimuths as an additional method of transmission but has not sufficient information on which to base a conclusion as to its practicality.

Continuous telephone transmission is objectionable because of the excessive burden on observers and readers. Careful and accurate work should not be expected for any but a very brief period.

Continuous determination of target positions is very desirable as affecting the accuracy of predictions. Any installation, however, should be adapted to periodic telephone transmission.

It is doubtful if a better prediction can be made without specific knowledge regarding limitations (direction of channels, etc.) as to future movements of the target, than on a tangent to its course at the last determined position.

7. The development of mechanical devices which can be furnished at reasonable cost to Coast Artillery batteries both fixed and mobile, to perform the operations now performed by the plotting board and range correction board, is an undertaking important to the service.

The graphical representation of the course of the target is an advantage not possessed by the mechanical computers tested. Separate treatment of the range and azimuth problems, however, give satisfactory results. Ballistic and arbitrary corrections in range and azimuth can be applied conveniently on range and azimuth prediction boards.

The most important development in plotting room equipment is that of a simple, inexpensive, rugged, and compact device for solving the range triangle. Further development should be in the direction of including within the same device, facilities for determining set-forward points and applying corrections so that, based on periodic or continuous information from any two observing stations, corrected set-forward ranges and azimuths could be read directly from the instrument.

Recommendations:

1. The Coast Artillery Board recommends that efforts to develop a computing instrument for the solution of Coast Artillery fire control problems be continued, based on the results of the Panama tests.

2. The Board has no recommendation to make concerning remuneration to the Ford Instrument Company for services rendered.

2. Project No. 22, Test of Peycreu Antiaircraft Sight for Machine Gun.—This sight was given a thorough test by the 61st Artillery Battalion, (AA) during recent target practice. The Board recommended, as a result of this test, that the sight be not adopted for use with antiaircraft machine guns,

and that the Ordnance Department design and manufacture for experimental test, an antiaircraft machine gun sight which will meet, as far as practicable, the following requirements:

- a. It should be simple in design and operation, capable of successful manipulation by the average enlisted man.
- b. It should be sufficiently rugged in construction to withstand the rough treatment incident to field service conditions.
- c. It should require the minimum amount of mental effort on the part of the gunner (i. e., calculation of ranges, speed, etc.) to direct the gun fire at the target.
- d. It should require the minimum amount of adjusting before firing.
- e. It should compensate automatically for as many variable sighting elements as possible (i. e., drift of bullet, jump of gun, speed, range, altitude of target, and effect of high angle fire on trajectory.)
- f. It should be capable of being used in an emergency as a sight against ground targets.
- g. It should allow the gunner freedom of both hands, so as to enable him to maneuver his gun freely about the tripod.
- h. The general characteristics of the design should be the same for the .30 caliber gun, .50 caliber machine gun, and should be applicable to the 37-mm automatic gun if one is designed.

3. Project No. 77, Test of Forward Area Antiaircraft Sight for Machine Guns.—The Board recommended, as a result of tests conducted by the 61st Artillery Battalion, (AA), under the supervision of the Coast Artillery Board, that the Forward Area Sight be adopted temporarily until a sight is designed to meet as many of the requirements listed under paragraph 2 above, as is practicable.

4. Project No. 96, Test of Army Flashlight, Model 1922, (Experimental).—This flashlight was tested under the supervision of the Board by the authorities at Fort Eustis, Coast Defenses of Chesapeake Bay, and by the 61st Artillery Battalion, (AA), to determine, respectively, its suitability for mobile Coast Artillery units, fixed defenses, and antiaircraft artillery units. It was found that this flashlight, although not as convenient as the cylindrical commercial type, would serve the purpose of the Coast Artillery. It was recommended that the question of its adoption as standard be left to the other using branches of the Army.

5. Project No. 137, Test of Observation Telescopes for Antiaircraft Artillery.—The following telescopes were submitted for tests: One French monocular telescope, one German binocular telescope, one British binocular telescope, and one British telescope with eyepiece offset 45°.

The Proceedings of the Coast Artillery Board on this Project, as submitted to the Chief of Coast Artillery, are as follows:

Conclusions:

1. That none of the telescopes submitted fulfill the requirements of an antiaircraft observation telescope.
2. That a telescope having the following characteristics would be suitable:
 - a. A monocular telescope with eyepiece offset at 90°.
 - b. A variable power with a maximum power of about 30.
 - c. An objective of approximately 3 inches in diameter.

- d. An elevation scale graduated in mils to read approximately 1500 mils in elevation, least reading 10 mils.
- e. An azimuth circle graduated in mils to read 6400 mils, least reading 10 mils.
- f. A means for levelling.
- g. Slow motion worm gear, in azimuth and in elevation.
- h. An amber and blue ray filter to cut glare and give better definition of targets against blue and white background.

Recommendations:

- 1. That an experimental telescope having the above characteristics be designed and manufactured by the Ordnance Department and submitted to the Coast Artillery Board for test.
- 2. That the telescopes submitted by the Ordnance Department for examination and test be returned to that department.
- 6. **Project No. 145, Review of Training Regulations 345-220, The Battery Command.**—The Coast Artillery Board concluded its review of these regulations and recommended certain changes in the text as written.
- 7. **Project No. 148, Test of Antiaircraft Tripod for Caliber .50, water cooled machine gun.**—Test of this tripod determined that the gun is balanced sufficiently well to permit firing at antiaircraft targets; that the mount is stable, rugged, and not too heavy, and that the elevating and traversing features are well adapted for antiaircraft firing. The Coast Artillery Board recommended that the modified antiaircraft tripod and cradle for the caliber .50 machine gun be adopted for service.

C. Charts and Tables:

The following charts and tables were furnished by the Coast Artillery Board during the month of August:

Ordnance Officer, Ninth Corps Area:

Two copies of corrected range table for Battery *Chamberlin*; two copies of Range-Range relation table using 108 lb. projectile as standard.

Commanding Officer, Coast Defenses of Cristobal:

Two brown print copies of elevation tables, range correction charts, and velocity graphic charts for 14-inch guns, Batteries *Stanley* and *Mower*.

Commanding Officer, Coast Defenses of Balboa:

Two brown print copies of elevation tables, range correction tables, and velocity graphic charts for 14-inch guns at Batteries *Burnside*, *Buell* and *Warren*.

Ordnance Officer, First Corps Area:

Two copies of service and subcaliber elevation tables for Batteries *Foote* and *Milliken*.

Department Ordnance Officer, Philippine Department:

Twenty-two brown prints for various batteries of the Coast Defenses of Manila and Subic Bays.

Department Ordnance Officer, Philippine Department:

Two copies each of elevation tables, range correction charts, and velocity graphic charts for the 14-inch batteries *Woodruff*, *Wilson* and *Marshall*.

Two copies each of elevation tables for 14-inch batteries *Merriam*, *Leary*, *Farley* and *Osgood*.

Commanding Officer, Coast Defenses of Honolulu:

Two copies of R. R. tables for 1400-1560 lb. projectile.

Ordnance Officer, Ninth Corps Area:

Two copies of corrected range table for 6-inch battery, *Willapa Bay*.

Note: The last revision of the Pratt Range Correction Chart involved a change in the wind correction, so that instead of entering the chart with the surface WIND, the BALLISTIC WIND is entered in a revised set of curves. It is understood that at some Coast Defenses the old chart containing a set of WIND curves is being improperly used for entering with the BALLISTIC WIND. New charts for use with the BALLISTIC WIND should be obtained by applying to the Coast Artillery Board.

2. Project No. 78, Method for Obtaining Deflections from Direction Prediction Boards.—The conclusions and recommendations of the Coast Artillery Board on this Project were published in the August 1923 issue of the Coast Artillery Journal. The following is a description of the above method, as submitted to the Coast Artillery Board by Captain J. C. Haw, C. A. C.

A SCHEME FOR USING THE DIRECTION PREDICTION BOARD TO OBTAIN DEFLECTIONS

In "Plotting Station Organization and Equipment," published in the JOURNAL U. S. ARTILLERY, for June 1920, Major E. J. Cullen, C. A. C., describes a system of fire control that involves the use of a "Direction Prediction Board". This Board is primarily designed to give predicted azimuths for Case III. The purpose of the present scheme is to enable this board to be used with equal ease for the determination of deflections for panoramic sights when aiming points are used, and also for the calculation of deflection for the familiar telescopic sight used on fixed armament for direct aiming upon the target (Case II).

In both cases, described below, the "Fire Correction" is to be made upon a set of fire correction curves plotted on the Direction Correction Board. As described by Major Cullen, the latter board carries but one set of curves, so its operator could easily handle the additional work. If these fire correction curves are in terms of angular measure, they will be straight vertical lines; if desired, however, they may be drawn in terms of brackets or probable errors, in which case they would not be straight.

The method described in the preceding paragraph eliminates the "Fire Correction Scale" from the vertical T-square of the Direction Prediction Board.

MODIFICATIONS OF THE DIRECTION PREDICTION BOARD

A. To obtain deflection for Panoramic sight with aiming point.

It is assumed that the sight is graduated in degrees and hundredths, increasing from zero to 360. It is also assumed that the T-square used on the Direction Prediction Board is of the type shown in Figure 1, which is basically identical with that described by Major Cullen. Modifications are discussed below.

Necessary modifications of the vertical T-square of the Direction Prediction Board: The "fixed index" shown by Major Cullen in Figure I of his article, must be replaced by a "movable index" which can be moved up and down and clamped in any position; it slides in the groove normally occupied by Major Cullen's "Slide B". The Fire Correction Scale is eliminated, as previously stated, leaving a single correction scale on Slide A. This Correction Scale is therefore fixed with reference to the Direction Reading Scale. The Correction Scale is numbered to correspond to the Direction Correction Board, but this numbering must increase in the opposite

direction to the usual numbering. Great care must be taken to see that the numbering of the correction scale increases in the proper direction, for this direction may vary with the kind of sight used and the manner in which the curves on the direction correction board are drawn. The numbering shown in Figures 1, 2, and 3, herewith, may not always apply. The phrase "increase in the opposite direction to the usual numbering" will be better understood after a full study of the rules below. This change in numbering could be accomplished by adding a

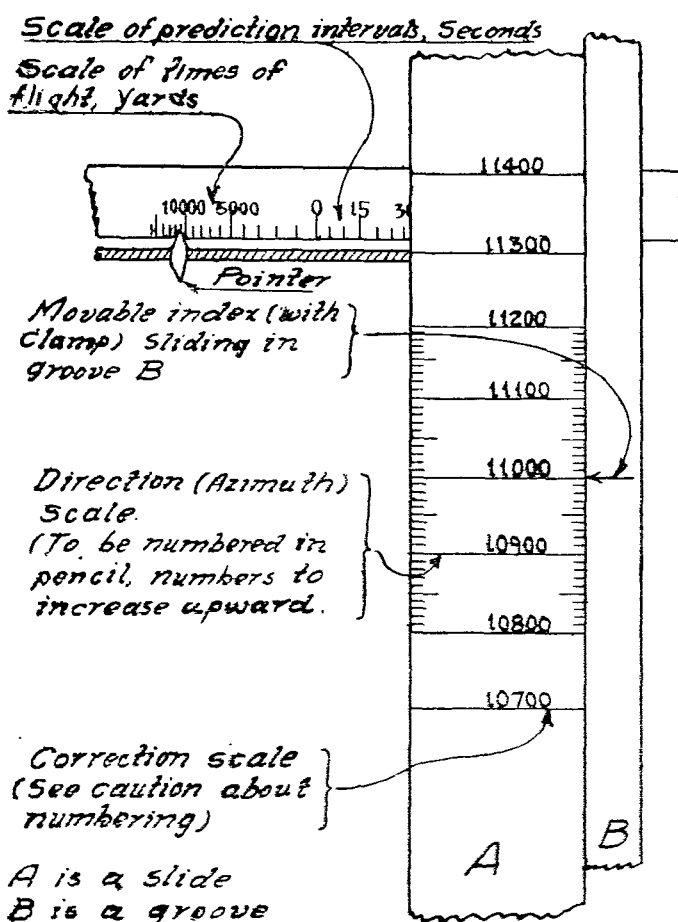


FIG. 1. VERTICAL T-SQUARE OF AZIMUTH PREDICTION BOARD

supplementary set of numbers in red ink; but there would be less liability of error if an auxiliary scale or a thin strip of metal or other material were prepared, which could be quickly placed above the ordinary scale and held in position by pegs, screws, or other means.

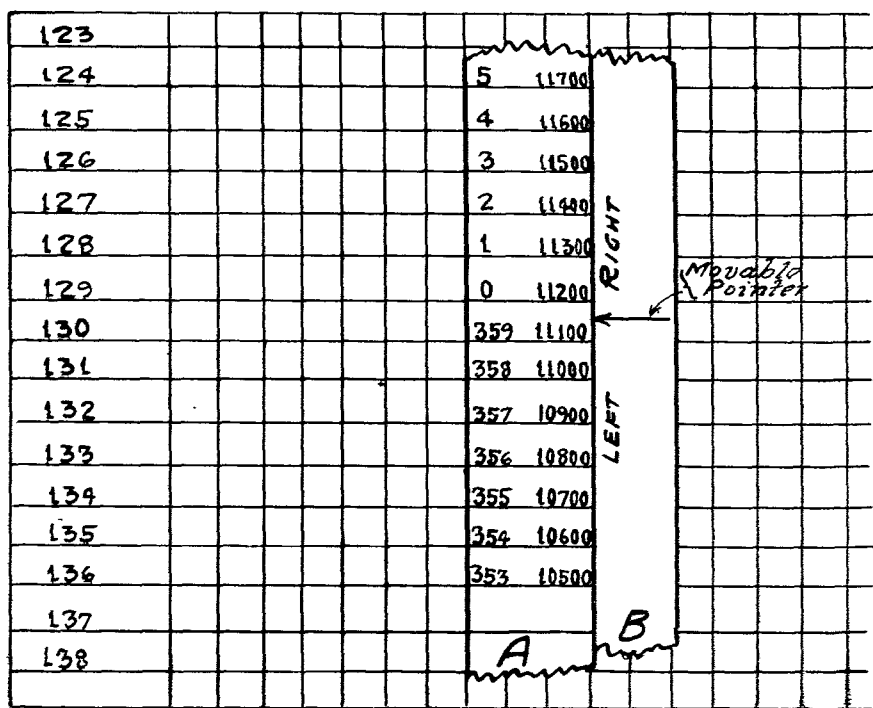
In the following description, in order to emphasize the simplicity of the rules which must be followed, the rules are italicized while the explanatory matter is not.

Procedure

1. Number the horizontal (azimuth) divisions of the board (not the T-square to suit the field of fire. numbers to increase downwards.

2. Set the Direction Reading scale of the T-square so that its horizontal divisions coincide with those of the board.

3. Number one whole degree line of the Direction Reading scale as follows: Select a convenient whole degree line on the board. Subtract the number (azimuth) already assigned this line, from the azimuth of the integer of the aiming point. Write the remainder on the T-square division corresponding to the selected line. If the number of the selected horizontal line is greater than the azimuth of the aiming point, add



5366

FIG 2

360.00 to the latter before subtracting. For example, if the number assigned the horizontal line on the board which corresponds to the selected whole degree division of the Direction Reading Scale is 23.00 and the azimuth of the aiming point is 45.75, the number to be given to the corresponding division of the Direction Reading Scale is $45 - 23 = 22$. Again, suppose the azimuth assigned to the selected line on the board is 241.25 while the azimuth of the aiming point is 45.00, then the number to be assigned the corresponding division of A is $(45 + 360) - 241 = 164$.

4. Number the other whole divisions of the Direction Reading Scale to correspond increasing upwards.

Still complying with Rule 3, the number 359 was written on that line of the Direction Reading Scale that corresponded to the 130 line of the board. Following Rule 4, the other lines of the Direction Reading Scale were numbered to *increase upwards*, 359 giving the starting point.

Figure 3 shows Operation 5 completed. The entire slide A has been moved down by a 0.50 of a degree. To test our work, select at random the point Pin Figure 3. This represents a predicted point plotted on the Direction Prediction Board by the operator of that board. Its true azimuth is evidently 134.25. Then, omitting ballistic and fire corrections, the azimuth to be set on the panoramic sight should be

$$(129.50 + 360.00) - 134.25 = 355.25.$$

or the azimuth of the aiming point (plus 360.00) minus the azimuth of the predicted point.

Figure 3 shows that the Direction Reading Scale reads 355.25 for point P as it should.

We have now accomplished everything except the application of ballistic and fire corrections. It is stated at the beginning of this article, that these are both made on the Direction Correction Board, so a single reference number gives their combined value.

The necessity for reversing the numbering of the *correction* scale is now evident. As the numbering of the *Reading* scale has been reversed, it is of course indispensable that the numbering of the *Correction* scale should conform.

To apply corrections, proceed as follows:

6. *With board set as completed under Rule 5, clamp the movable index opposite the normal of the correction scale; the index remains clamped in this position as long as the same aiming point is used.* Figure 3 shows this operation completed.

7. *The proper correction reference number is set by moving slide A until this reference number is opposite the now fixed index. This is repeated whenever a new reference number is received, the index remaining fixed.*

8. *Plot the course on the Direction Prediction Board in the ordinary manner. The reading of the Direction Reading Scale opposite the Set-Forward Point is then the Corrected Sight Deflection to be sent to the pieces.*

The table below gives four examples of the method of marking the Direction Reading Scale. The first column shows the numbers assigned the horizontal lines on the Direction Prediction Board. The next four columns show, on corresponding lines, the numbers which would be given the graduations of the Direction Reading Scale for the four aiming points whose azimuths are given at the top of these four columns. The bottom line shows the amount by which the Direction Reading Scale would be displaced downwards in each case.

Numbers given horizontal lines on board.	Azimuths of Aiming Points.			
	30.05	115.75	200.30	281.60
	Graduations of Direction Reading Scale.			
	(360 + 30 = 390)	(360 + 115 = 475)	70.00	151.00
130.00	260.00	345.00	69.00	151.00
131.00	259.00	344.00	69.00	150.00
132.00	258.00	343.00	68.00	149.00
133.00	257.00	342.00	67.00	148.00
Amount by which Direction Scale is moved down.	0.05	0.75	0.30	0.60

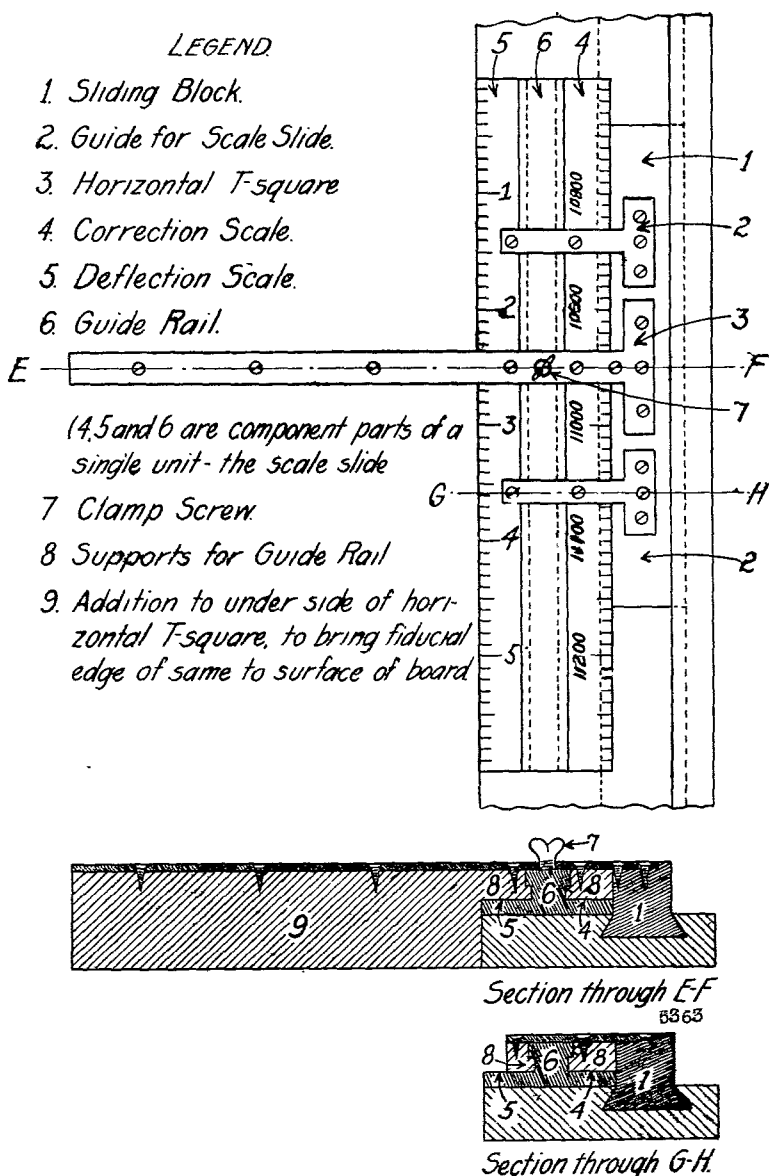


FIG. 4

TO OBTAIN SIGHT DEFLECTION FOR DIRECT AIMING (CASE II).

Necessary modifications of Direction Prediction Board.—Slide A, (Figure 1) is locked in one position. Major Cullen's slide B is withdrawn. This leaves a broad groove where slide B is normally placed. The device described below (horizontal T-square) slides in this groove.

DESCRIPTION OF HORIZONTAL T-SQUARE. (See Fig. 4).

Figure 4 shows the horizontal T-square assembled with the sliding block in position in the groove of the vertical T-square (groove normally occupied by Major Cullen's slide B). Here again, it is necessary to be very careful in numbering the correction scale in the proper direction to fit the curves of the direction correction board. The numbering shown in Figures 4 and 5 may not invariably be correct.

The sliding block (1) fits into the groove. To this block are screwed three pieces of stout sheet iron each cut in the shape of a T. These irons are mortised into the top surface of the sliding block so that their top surfaces are even with the top surface of the latter; this makes them remain rigidly at right angles to the block at all times. The slide scale (4, 5, and 6) is made as thin as possible and first over the scale A (Fig. 1). Both edges of this slide are graduated to correspond to the graduations of the Direction Prediction Board, the deflection scale (5) being numbered from 0 to 6 to correspond to the divisions of the deflection scale on the guns, (telescopic sights Model 1898, and 3-inch telescopic sight, model 1904); and the correction scale (4) being numbered with 11,000 as normal, to correspond to the reference numbers of the Direction Correction Board. This scale slide bears on its upper surface a T-shaped guide rail (6) which is necessary to hold the slide in position and to enable it to be clamped. The three irons borne by the sliding block each bear, on their under surfaces, supports (8) in which the guide rail moves freely; in addition to this, the largest of the three irons (3) carries a thumb screw by which the scale slide can be clamped in any position of its movement. This largest iron (3) also carries, on its under surface, a strip of wood, which increases accuracy of operation by prolonging the fiducial edge of this iron to the surface of the Direction Prediction Board. The lower edge of this horizontal T-square is used for all readings.

OPERATION. (See Fig. 5).

The horizontal T-square being assembled on the vertical T-square.

1. *Number the Direction Prediction Board to correspond to the field of fire, increasing downward.*
2. *Set the vertical T-square head at zero prediction interval.*
3. *Set the time of flight pointer on the head of the vertical T-square at the proper range.*
4. *Move the scale slide of the horizontal T-square until the proper reference number on the correction scale is beneath the lower edge of the horizontal T-square. Lock the scale slide in this position.*
5. *Plot the azimuth of the target in the usual way, and prolong the plot with the prediction ruler as usual.*
6. *Move the whole vertical T-square until the bottom index of the time of flight pointer is over the time line of the last plotted point.*
7. *Slide the entire horizontal T-square up or down until the lower edge of the horizontal T-square is exactly above the last plotted point.*
8. *Read the deflection to be set on the sight at the point where the predicted plot of azimuths crosses the deflection scale.*

From the above, it is evident that the corrections for wind, drift, and adjustment of fire are determined and combined on the Direction Correction Board, and applied to the sight setting by the operation of setting off the correction refer-

ence number on the horizontal T-square (operation 4 above). The only correction remaining to be applied is that for travel during the time of flight, and this is accomplished by predicting the plot for azimuths through the distance between the last plotted point and the edge of the deflection scale, this distance being equal to the time of flight (see operations 2, 3. and 6 above).

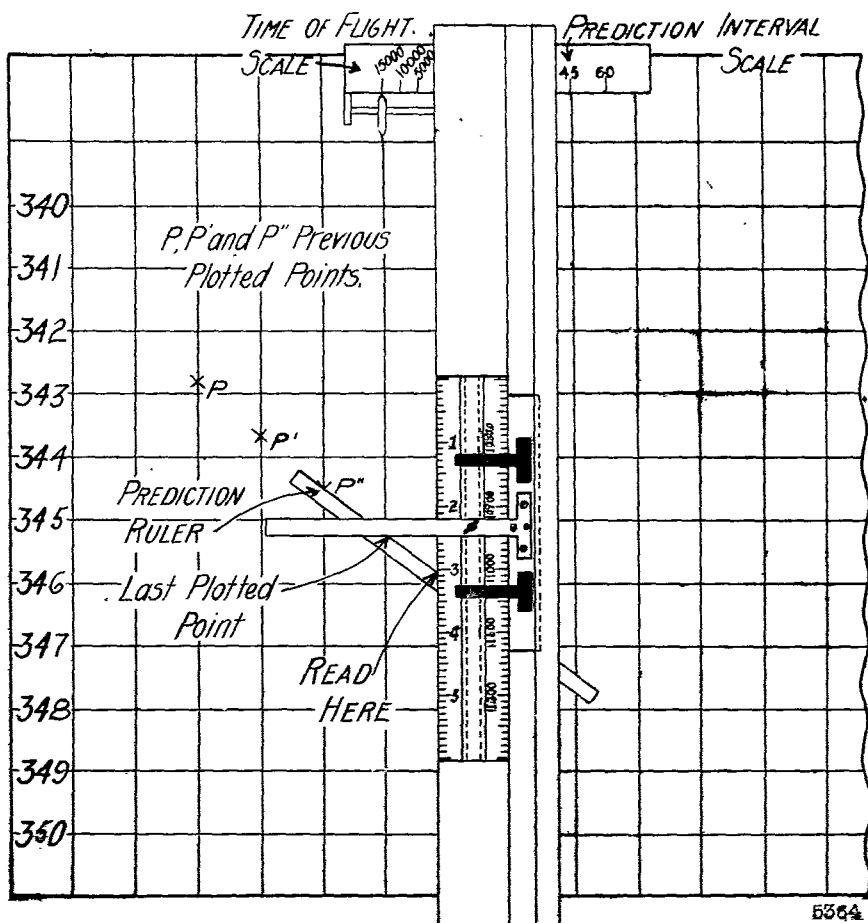
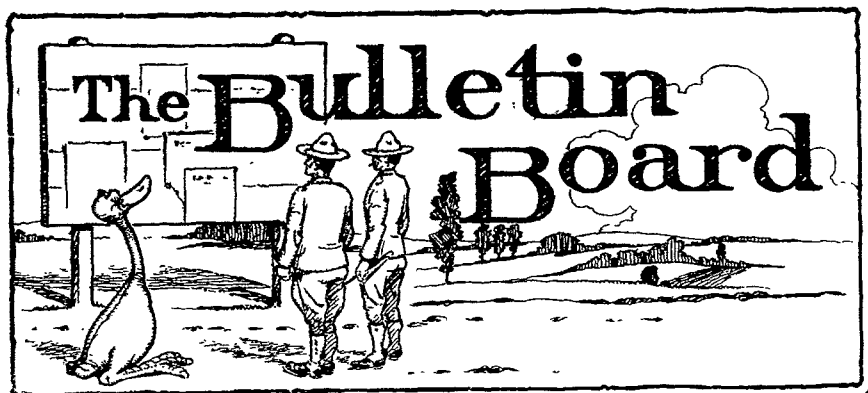


FIG. 5



Finals of Coast Artillery Corps Rifle Team at Camp Perry

The Coast Artillery Corps has reason again this year to be proud of its Rifle Team. It not only took fourth place in the National Pistol Team Match and fifth place in the National Rifle Team Match, but also came out third in the National Individual Rifle Match.

The Coast Artillery Rifle and Pistol Squad, after having spent the period July 1-August 31 in training at Wakefield, Mass., arrived at Camp Perry, Ohio, about the first of September for participation in the National Matches.

The lineup of the members of the Rifle Squad after the completion of the final ten days' elimination competition at Wakefield, was as follows:

1	Captain J. T. Campbell	3591
2	Lieutenant L. L. Lemnitzer	3588
3	Sergeant Otto Bentz	3588
4	Captain F. S. Swett	3573
5	Lieutenant H. I. Borden	3556
6	Corporal J. B. Grigsby	3556
7	Lieutenant G. F. Nichols	3538
8	Corporal J. J. Dyba	3536
9	Tech. Sgt. James Christian	3535
10	Captain M. H. Parsons	3519
11	Sergeant James Wertzberger	3518
12	Lieutenant L. A. White	3514
13	Captain C. E. Loucks	3512
14	Major C. W. Baird	3511
15	Master Sgt. Otto S. Hahn	3508
16	Lieutenant R. W. Crichlow	3500
17	Sergeant Earl B. Porter	3496
18	Lieutenant E. W. King	3491
19	Captain E. F. Olsen	3484
20	Sergeant G. B. Ping	3481
21	Sergeant P. J. White	3465
	Maximum possible	3900

Major W. D. Fraer and Lieutenant G. S. Vogel were the only members of the Pistol Squad to go to Camp Perry.

Lieutenants Trichel and Barnes were ordered to Camp Perry to attend the final tryouts of the American Team for the International Rifle Matches.

On September 4th the work on the Camp Perry range was started, and the scores of everyone immediately began to increase. This was due to the fact that the conditions at Camp Perry are much more conducive to the making of high scores than are those at Wakefield.

RESULTS OF INDIVIDUAL RIFLE MATCHES

200 yard Rapid Fire Match (772 entries)

Course: 10 shots rapid fire sitting or kneeling, Target "A"

- 2 Corp. Dyba.
- 5 Capt. Campbell
- 9 Corp. Grigsby
- 14 Lieut. White

300 yard Rapid Fire Match (756 entries)

Course: 10 shots rapid fire prone, Target "A"

- 11 Sgt. Bents

Championship Rapid Fire Match (478 entries)

Course: Aggregate of 200 and 300 Rapid Fire Matches

- 9 Lieut. White

Leech Cup Match (801 entries)

Course: 7 shots slow fire prone 800-900-1000 yards

- 2 Lieut. Barnes

Members Match (No places in first fifteen)

High Coast Artilleryman—Lieut. Barnes, 16th place

Navy Match (No places in first fifteen)

High Coast Artilleryman—Major Frazer, 21st place

President's Match (1118 entries)

Course: 10 shots standing 200 yards, 10 shots prone 600 yards, 20 shots prone 1000 yards

- 4 Capt. Campbell—Winner of Coast Artillery Cup
- 13 Lieut. Nichols

Marine Corps Match (929 entries)

Course: 20 shots prone 600 yards, 20 shots prone 1000 yards

- 9 Lieut. Trichel
- 12 Capt. Ryan

Wimbledon Cup Match (735 entries)

Course: 20 shots slow fire 1000 yards

- 14 Capt. Campbell

Individual Palma Match (608 entries)

Course: 15 shots slow fire 800-900-1000 yards

- 2 Capt. Campbell
- 8 Corp. Dyba
- 11 Major Fulton

Camp Perry Instructors Match (192 entries)

Course: 10 shots slow fire standing 200 yards (Rifle)

10 shots slow fire 50 yards (Pistol)

6 Corp. Dyba

8 Major Frazer

National Individual Rifle Match (1104 entries)

Course: 10 shots slow fire standing 200 yards, 10 shots rapid fire 200 yards,

10 shots rapid fire 300 yards, 10 shots slow fire prone 600 yards,

20 shots slow fire prone 1000 yards.

3 Lieut. Nichols—gold medal

25 Capt. Campbell—silver medal

34 Lieut. Tichel—silver medal

64 Capt. Ryan—bronze medal

67 Mas. Sgt. Hahn—bronze medal

Grand Aggregate Match (464 entries)

Course: Aggregate of scores made in the following matches:

Wimbleton—Marine Corps—Leech—Members'—President's.

7 Lieut. Trichel

8 Capt. Campbell

15 Major Fulton

RESULTS OF INDIVIDUAL PISTOL MATCHES

Individual Timed Fire, Re-Entry, 25 yards

10 Major Frazer

Individual Timed Fire—Single-Entry, 25 yards

1 Major Frazer

Individual Rapid Fire—Single-Entry, 25 yards

8 Major Frazer.

National Individual Pistol Match (302 entries)

Course: 2 scores, 5 shots each timed fire 25 yards, 2 scores, 5 shots each rapid

fire 25 yards, 2 scores, 5 shots each rapid fire 25 yards, 2 scores, 5

shots each slow fire 50 yards.

26 Major Fulton—silver medal

38 Sgt. Ping—bronze medal

51 Major Frazer—bronze medal

52 Major Baird—bronze medal

66 Mas. Sgt. Hahn—bronze medal

RESULTS OF TEAM MATCHES

Infantry Match (13 entries)Course: A field firing problem involving a skirmish run from 500 to 200
yards

Coast Artillery Team—4th place

Enlisted Men's Team Match (47 entries)Course: 10 shots per man standing 200 yards, 10 shots per man prone 600
yards.

Coast Artillery Team—6th place

Regimental Team Match (41 entries)

Course: Same as for Enlisted Men's Team Match (Shown above)

Coast Artillery Corps, Fort Monroe—3rd place

Herrick Trophy Match (32 entries)

Course: 15 shots per man at 800, 900, and 1000 yards

Coast Artillery Team—6th place

National Pistol Team Match (16 entries)

Course: Same as for National Individual Pistol Match

Team: Major Frazer, Major Fulton, Lieut. Vogel, Sgt. Hahn, Sgt. Christian
Coast Artillery Corps—4th place

Note: 1st, 2d, and 3d places were won by the Infantry, Marine Corps
No. 2 and Marine Corps No. 1 Teams respectively

National Rifle Team Match

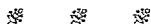
Course: 10 shots slow fire 200 yards, 10 shots rapid fire 200 yards, 10 shots rapid fire 300 yards, 10 shots slow fire 600 yards, 10 shots slow fire 1000 yards.

Team: Major W. S. Fulton (Team Captain), Capt. W. W. Rhein (Team Coach), Capt. Campbell, Capt. Parsons, Lieut. Nichols, Lieut. Borden, Lieut. White, Lieut. Lemnitzer, Sgt. Porter, Sgt. Hahn, Sgt. Bentz, Sgt. Christian.

Coast Artillery Corps—5th place

Note: 1st, 2d, 3d, and 4th places were won by the Marine Corps, Cavalry, Infantry and Navy Respectively.

About fifty contestants reported for the final tryouts for the American Team for the International Matches, the Coast Artillery Corps being represented by Lieutenants Barnes and Trichel. After several days shooting the final squad, numbering eighteen, was selected. Lieutenant Barnes made fourteenth place and Lieutenant Trichel eighteenth place. These officers did not make the International Team, but having placed on the final squad, will be given an opportunity to try for places on next year's Olympic Team.



Anent the Coast Artillery Rifle Trophy

COAST ARTILLERY RIFLE TEAM

Bay State Rifle Range

Wakefield, Mass.

August 28, 1923

My dear Major Clark:

Will you please convey, through the *JOURNAL*, to the officers and men of the Coast Artillery, the appreciation and thanks of the Coast Artillery Rifle Team, for the cup which has been presented to us.

This cup, as you no doubt know, is to be awarded annually to the Coast Artilleryman making the highest score in the President's Match.

It is a source of pride and gratification to feel that the Corps is so strongly behind us in our work in connection with the rifle team, and we shall endeavor, as

we always have, to do our utmost in order that we may be deserving of this kindness and interest which has so generously been displayed. It will always serve as a reminder to us that we are not alone in our efforts to place our rifle and pistol teams at the head of the lists.

With my very best wishes, believe me I am,

Sincerely yours,

(Sgd) WILLIAM S. FULTON,

Major, C. A. C.,

Captain Coast Artillery

Rifle Team 1923

Anniversary of Organization of Coast Defenses of Savannah

The 121st Company, C. A. C., consisting of Captain P. S. Roper, Technical Sergeant Dallas M. Sprinkle, Staff Sergeant Andrew J. McLarney and the fourteen men of the Company celebrated the 25th Anniversary of the organization of the Coast Defenses of Savannah by a banquet on August 2, 1923, at Barbee's Pavilion, Isle of Hope, Georgia. The Infantry Post Commander of Fort Screven and his Adjutant were present and each gave a short talk, while Captain Roper presented a brief history of the Defenses. The dinner was preceded by an afternoon devoted to swimming and athletics. As a souvenir of the event, a very tasteful program and menu card was provided for the members of the Company and their guests.

"The Projectile" Appears

There has just reached the Editorial Desk a recent issue of *The Projectile*, a snappy journalistic sheet issued in mimeographed form by the 364th Company, C. A. C., of the 13th Coast Defense Command, New York National Guard. We don't know who the Editor is, but he displays a keen talent which would find adequate expression in a wider field. However, for the sake of the Coast Artillery, and particularly the 364th Company, we are glad that this anonymous Editor is on the job.

The Coast Artillery in general will be interested to know that the 364th Company has been maintaining 100 per cent attendance at camp and drill, and are now going after the attainment of 100 per cent authorized strength as well as 100 per cent attendance. In addition to this information, the little sheet is full of the personal quips and notes which are bound to be appreciated by all the members of the Company other than the one hit. In short, this Company, by its little paper, has hit upon one of the available means of stimulating *esprit* and the maintenance of a live-wire outfit.

The following is a roster of the officers now pursuing the various courses at the Coast Artillery School:

Officers Attending the Coast Artillery School

BATTERY OFFICERS' COURSE

Captains
Ferdinand F. Gallagher
John B. Martin
Joseph W. Barker

Nyal L. Adams
William Hesketh
Reamer W. Argo
George W. Whybark

Kenneth McCatty
 Kenneth S. Purdie
 Ira B. Hill
 LeRoy H. Lohmann
 Percy C. Hamilton
 Arthur W. Burton
 Joseph Twyman
 Herbert Winterburn
 Franklin E. Edgecomb
 James G. Devine
 William H. Sweet
 James P. Jacobs
 Ernest C. Bomar
 Arthur J. Lacouture
 John T. Lewis
 George W. Ricker
 Charles S. Harris
 Albert C. Cleveland
 William W. Wertz
 Ralph E. Hill

Edward H. Taliaferro, Jr.
 Francis J. Fitzpatrick

1st Lieutenants

Harry C. Barnes, Jr.
 Geoffrey M. O'Connell
 William Q. Jeffords, Jr.
 Allan P. Bruner
 Harry W. Lins
 Phillip D. Terry
 Arthur K. Chambers
 James F. Pichel
 Otto Marshall
 Harold W. Smith
 Orley DeF. Bowman
 Abraham L. Bullard
 Clarence O. Bell
 William E. Griffin

Captains (Cuban Army)

Aniceto Sosa
 Mario Torres.

ADVANCED ENGINEERING COURSE

Captains

John S. Smylie
 Henry B. Holmes, Jr.
 Rolla V. Ladd
 Leon C. Dennis
 Hugh N. Herrick

1st Lieutenants

Ellis D. Weigle
 Edward G. Cowen
 Alan F. Cameron
 Kenneth C. Bonney
 Alexander L. Haggart.

SPECIAL COURSE FOR NATIONAL GUARD AND RESERVE OFFICERS

Harbor Defense Artillery

Captain Kenneth M. Barager, C. A. California N. G.
 Captain Leslie B. Dyer, C. A. Maine N. G.
 Captain Philip Hurley, C. A. Conn. N. G.
 Captain Charles Keveney, C. A. Mass. N. G.
 Captain Roy M. Somers, C. A. Maine N. G.
 1st Lieutenant Ernest Santangini, C. A. Rhode Island N. G.
 2nd Lieutenant George Fein, C. A. Organized Reserves
 2nd Lieutenant Warrent J. Watrous, C. A. Florida N. G.

Anti-aircraft Artillery

Captain Charles O. Brown, C. A. Organized Reserves
 Captain Samuel G. Herrin, C. A. Arkansas N. G.
 Captain William W. Ramsey, C. A. Delaware N. G.
 Captain Peter W. Stauffer, C. A. Penna. N. G.
 Captain Clarence W. Wahle, C. A. New York N. G.
 2nd Lieutenant Jackson M. Brown, C. A. Organized Reserves
 2nd Lieutenant John B. Gegan, C. A. Organized Reserves
 2nd Lieutenant Raymond L. Hall, C. A. North Carolina N. G.
 2nd Lieutenant Paul O. Langguth, C. A. Organized Reserves.

Meet Mr. Oozlefinch

From *The Recoil*, the Fort Monroe R. O. T. C. Camp newspaper, of June 29, 1923

Perched upon the mantel-piece of the Gridiron room in the Fort Monroe Officers' Club, the curious or admiring may see the one and only "Coastillery Bird", the Oozlefinch, mascot of the Coast Artillery Corps. Let no one be so vulgar as to call him "Oozy" for short.

The specimen in the glass case is the only one in captivity; indeed we know of but one other member of this species, viz: the "Transplanted Oozlefinch."

A member of the Officers' Club announced the capture of the original Oozlefinch in 1905, and presented it to the club which immediately adopted it as its mascot. It is a male bird, and his most remarkable characteristic is his habit of flying backwards to keep the dust out of his eyes.

During his captivity he has responded in divers ways to his environment. At the time of capture his mouth was able to imbibe a quart per minute, and his protruding eyes were capable of discerning an approaching glass or bottle at an incredible distance in any direction whatever. During the three years that he was perched behind the club's bar he never refused a drink and in that period his mouth trebled in capacity and his eyes became greatly enlarged and increased in penetrating power. The neck, already of great length, elongated at the rate of one-eighth inch per minute, increasing the time of transit of the "likker" and prolonging the delightful taste.

These changes in the features of the mascot caused great concern among the club members. Although he always paraded his only feather with great gusto and abandon, his constant inebriated condition was a reflection upon the club, and so somebody devised the plan of turning his mind from drink to gambling.

In 1918 he was moved from the bar to his present position on the mantel, and was placed in a glass case to prevent his likkeriferious instincts leading him from the straight and narrow path, and also to secure him against the attentions of visitors who sometimes attempted to lure him away.

The Artillery Board met in the same room with Oozlefinch. He witnessed the compilation of the present Coast Artillery Drill Regulations. Once imbued with the spirit of the Artillery he forsook dice and "likker" forever. His service to the Corps as tactical adviser and builder of morale has been inestimable.

In 1918 a strange bird with distinct Oozlefinch attributes was observed to roost at night upon the rolling stock of the Railway Artillery Reserves, A. E. F. This bird was equipped with trench helmet and wrist watch. He rapidly made friends with the personnel who named him the "Transplanted Oozlefinch" and adopted him as their mascot. Fort Monroe was somewhat disturbed at the first news of the discovery of a second Oozlefinch, but the name "Transplanted Oozlefinch" was taken as an admission of the superiority of the original. Its eyes were not unduly prominent, nor did it fly backwards. In spite of the lack of prominence of eyes, he was capable of observing everything within many kilometers.

An artist fortunately made a drawing of the Transplanted Oozlefinch and incorporated it in the emblem of the R. A. R. He is depicted perched on a section of rail (symbolic of the R. A. R.) with his left foot cocked in the air, and wearing a wrist watch on his left leg.

After having fired 5,568,000 lbs. of steel into German territory the T. O. disappeared one dark night from his perch on an ammunition car and has never been seen since, but his memory is preserved to posterity by the R. A. R. emblem. We may still rejoice that the original Oozlefinch, the one and only "Coastillery Bird" remains in captivity as the celebrated mascot of the Coast Artillery Corps.

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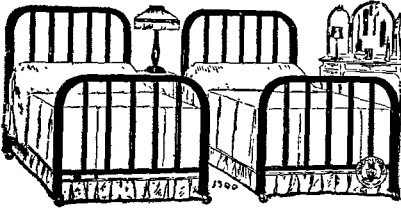
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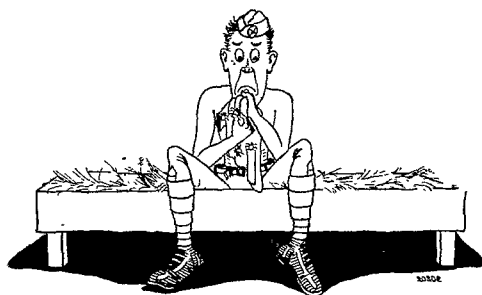
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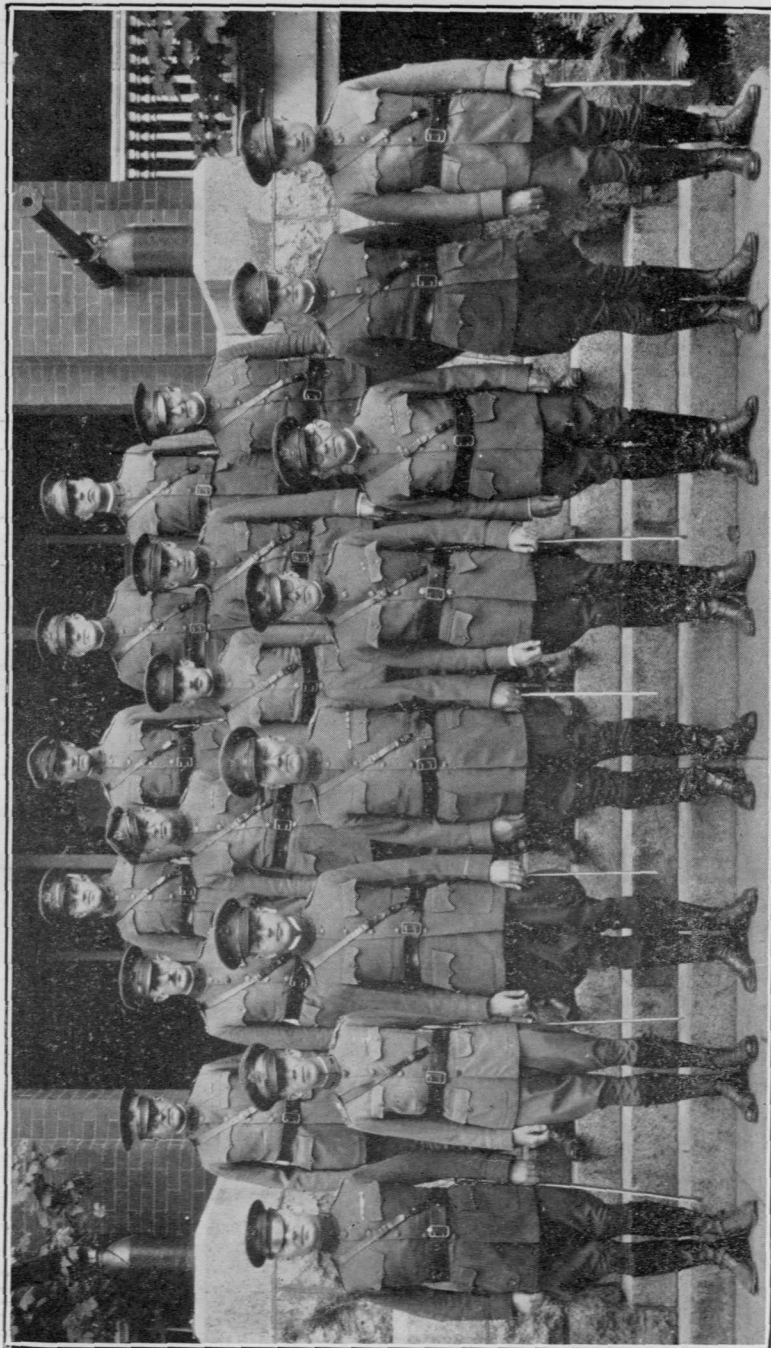
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